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INVESTMENT BUILDING **WASHINGTON, D. C.**

Better Crops with PLANT FOOD

The Whole Truth—Not Selected Truth

R. H. STINCHFIELD, *Editor*

Editorial Office: Investment Bldg., Washington, D. C.

VOLUME XXIV NUMBER ONE

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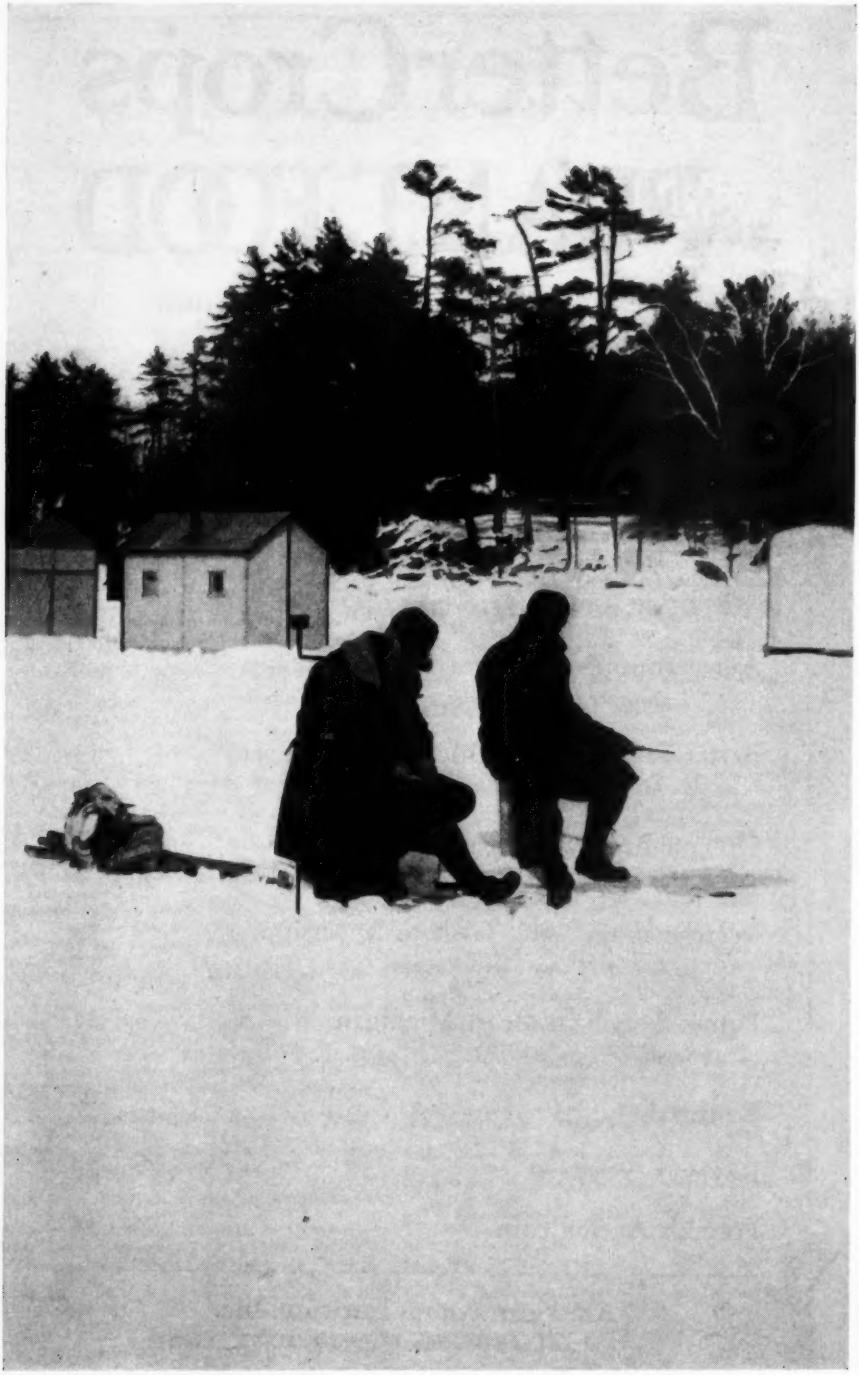

BIG ONES GET AWAY, EVEN IN JANUARY

Better Crops with PLANT FOOD

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VOL. XXIV WASHINGTON, D. C., JANUARY 1940 No. 1

When you look back, remember—

So Did Lot's Wife

Jeff McDermid

IF YOU ARE like me you spend so much time mooning about the past that you don't get full value out of the present, or you have so many problems in the present that you don't plan enough for the future. No doubt the safe and sane system would be to bury the past as you forget a dream, seize on the present as though it were your only day, and leave the future to the weather man, the political dopester, and the "outlook" economists.

Supermen may be able to order their lives that way, but us folks of modest attainments are limited for the present by our past and circumscribed by modern complexity respecting the future. So about all we can talk about is what we have known and experienced, and our imagination and resources are not stream-lined enough to carry us forward into the future at a rate that makes good reading.

I am of the ordinary tribe who are both *beholders* and *beholden,* if you get my idea! I am one who has been an observer, a spectator, a recorder, and probably a poor enough one at that, in eyesight, hearing, and fact-finding. Moreover, I have been beholden to many brilliant, visionary, and daring and competent minds for the comforts and the wonders which surround me. In none of my moments have I been the originator of a novel, new, and vital thing to contribute to the advancement of science or knowledge.

Consuming, enjoying, harvesting,

using—that's my sphere—stopping occasionally to praise a professor or applaud an inventor, hunting for bigger words and blacker type—but only to echo and announce his fame.

Only one morsel of comfort remains in this self-analysis of my futility. Perhaps one who sings the praises and sounds the phrases does something to widen the path to the legendary man-with-the-mouse-trap, and to stake out the route that soon becomes a concrete highway of successful practices. Yet that brief satisfaction vanishes by comparison with other commentators whose audiences have been wider, and whose methods have been more effective. In other words one often feels like the man with the WPA trowel trying to dig up dirt alongside a steam-shovel.

HENCE I resort to my woodchuck habits and start digging into the past, in a sort of frenzy to heap more native soil over my fuzzy head and sleep through another winter, while other folks do the brain work. But it's only three months until spring anyhow, and usually our confidence returns with the robins.

Strange enough I find myself in goodly company while browsing through old records. It was just the other evening that a crew of us had tried to digest a hearty holiday repast by trotting out sundry opinions and forecasts about current events. We found the world was a dismal puzzle piece and blatant propaganda limited our powers of proper analysis. The domestic picture proved equally foggy in spots, and so defenders of this or that or the other economic dogma were loath to subject themselves to argument around the social hearth. As humble stage-hands and scene-shifters in the current drama, we felt inadequate to pose as its contemporary front-row critics. And of course it wouldn't be polite to get drunk on our hosts' vintage and so acquire sudden wisdom and vociferous omnipotence.

So as a last resort somebody carried in a pile of old magazine files discovered in a library upheaval. They were fortunately agricultural periodicals, copies of a farm journal nearing its century mark in a thriving State. These were handed around to the expectant company, so that each might find a passage therein to lighten the passing hour.

I DARE say no other medium would suit so many small town browsers. The atmosphere of the farm includes that of the home, and they both border the growing centers of population sufficiently to be of wide historical value. Old engineering, scientific, or architectural files fall short of the mission and do not draw folks together in quite the same friendly fashion as a musty set of midwest farm pamphlets.

As our company was of wide and varied talents and interests, it occurred to me to challenge them to take their issues up respectively and scan them for items of particular reference to the calling or profession they embraced. Having found the present none too comforting or assuring, and not caring to stick out their necks too far anent the future, it was relatively easy for these motley people to relax and peek into pages of the past.

YE EDITOR himself was the first to locate a piece appropriate to his calling in the ancient files. It consisted of a 13-em or narrow single column galley strip pasted on the fly leaf of the dog-eared volume. We could almost see the scribe laboriously swabbing his glue pot and laying in those inserts himself. Here is what his year-end message carried to scanty subscribers in log cabins lit by guttering tallow dips of 1855:

"When the publication of *The Farmer* was commenced a copy of it at fifty cents a year bought a bushel of wheat. Now fifty cents buys only a peck to half a bushel. Suffice it to say it did not pay at fifty cents, and it has only been maintained for some time

past by extra exertions and double toil of its former publisher. This overtax of work often delayed its publication and deranged its affairs in various ways. The only wonder is that he did it so well, and the greatest regret is that it has not left him a more ample reward for his years of useful toil.

"Our only alternative was to continue *The Farmer* in its present form to keep within paying limits, or to raise the price and bring the paper up to the standard of a first class journal. Choosing the latter course, we feel sure that our readers who appreciate the wants of the times will approve of our plan. We do not propose to make a cent out of the change in price for the present, but to expend every dollar from subscriptions in placing the paper upon a basis of permanent usefulness. We cordially invite all the best practical talent in the State to contribute to our columns. Let us labor and work together in the upbuilding of our young and noble commonwealth, as it is worthy of our best ability and most earnest labor, until bad farming and neglected land are among the things of the past. Then when our own labors draw to a close we may feel that we have not lived wholly in vain and that the world is better for what we have eaten, drunk, and used of it."

One of the guests who was employed in an advertising agency thumbed through a few of the files subsequent to the editorial announcement, and remarked that although the rate of one hundred and fifty dollars a year per full page insertion was cheap enough in today's calculations, the service on cuts and proof reading appeared to be rather deficient. He also remarked that there was evidently no close censorship inveighed on commercial advertisers, pointing out two or three florid patent medicine displays which guaranteed to cure everything—dimness of vision, dots or webs before the eyes, dull pains in the head or chest, deficient perspiration, constant imaginings of evil, and great depression of spirits.

"I also find," continued this authority on merchandising, "that the old-time farm journals had access to means of advertising revenues unknown to our agricultural press today. They carried railway time-tables, millinery and clothing cards, announcements of courses in female seminaries, commercial colleges, and even the State university itself. And here inserted between ads for parlor stoves and Suffolk pigs is a rare gem of copy prepared by a watchmaker and jeweler. He claims the stock is so varied as to make his store the favorite resort of persons of 'all ages and sexes.' "

"OH, HO," exclaimed the sociologist among the company, seizing his moment of rapture to read aloud a statement taken from a complete report of a speech made at the State Fair by a Professor of Education. "Here, folks, get this—you can see that men feared the effects of city life on the purity of farming away back when the land was young. Listen to what the old professor has to say after about two hours of warming up:

" 'If our towns and villages are ever saved it will be only because they are alive with the industry of your rural art and adorned by the virtues of your country lives. If our great cities are ever saved from becoming a dead sea of sharks and a Sodom of snobs and flunkeys, it will be only because the streams of virtue and of true manhood

(*Turn to page* 46)

Agronomic Problems of the South

By M. J. Funchess

Director, Alabama Experiment Station

(An address given before American Society of Agronomy at New Orleans, Nov. 23, 1939.)

NEARLY a year ago your President caught me in an unguarded moment and induced me to consent to prepare a paper for this meeting dealing with the subject, "Agronomic Problems of the South." Before attempting to enumerate and enlarge upon some of the specific problems that the agronomists should tackle in their efforts to improve southern agriculture, let me give you a few comparative figures which picture agricultural conditions in the South. The comparative figures deal with 10 southern States that produce a large amount of cotton, and a specific comparison between Alabama and Iowa.

The average cash returns from all crops per capita from 10 southern States in 1937 amounted to $104. For Alabama this figure was $73, and for Iowa $77. The cash returns from all livestock and livestock products from the 10 southern States was $45, from Alabama $20, and from Iowa $469. Cash returns from all crops, from all livestock, and from Government payments for the 10 States was $158, for Alabama $100, and for Iowa $571. These very great differences in per capita income may be readily understood from the following figures.

The number of acres of farm land per capita in the 10 States was 24, while in Alabama it was 14, and in Iowa it was 35. The number of acres of harvested crops for the 10 cotton-producing States was 7, for Alabama it was 5, while for Iowa it was 20. In 1937, Alabama farmers planted 3,493,000 acres of corn that produced an average of 14 bushels per acre, or a total of approximately 49,000,000 bushels of corn. That same year, Iowa farmers planted 9,636,000 acres of corn with an average yield of 45 bushels per acre and a total production of 438,438,000 bushels. The Iowa farmer planted nearly 3 times as many acres of corn, but produced nearly 10 times as many bushels as the Alabama farmer secured for his effort. Alabama farmers had 132,000 acres in oats that produced an average of 24 bushels per acre and a total crop of 3,168,000 bushels. The Iowa farmers planted nearly 6,000,000 acres in oats; produced an average of 33 bushels an acre, and harvested 198,000,000 bushels of oats.

Must Increase Production

These figures relative to acreages and yields readily explain why the average farmer in 10 southern States secured a total cash income of $158, and why the Alabama farmer secured a cash income of only $100, while the Iowa farmer secured an average of $571 per capita. It is perfectly clear that southern farmers will not be much better off than at the present time, until their production of farm crops is increased. The southern farmer can never produce much in the way of livestock or livestock products, until there is an adequate production of feed and forage. These opening statements clearly outline in general the nature of the most important problems that the southern agronomists must tackle.

In the following pages, an attempt is made to present to this group a discus-

sion of some of the unsolved or partially solved agronomic problems of the South. It is not claimed that this is a complete list of problems falling in these categories. Probably the list might be very greatly extended. In presenting this list of suggestions, the views expressed are those of the writer and of the staff of the Agronomy Department of the Alabama Experiment Station. No attempt has been made to make a composite list of problems based on suggestions from other southern experiment station groups.

A glance at reported crop yields from most of the southern experiment stations will show that yields from check plots and from plots receiving good fertilizers are sometimes double or even treble the average crop yields from the particular State in which the report originates. This means that in practically all cases field plot experiments are located on land that is very much more productive than the average land in the area represented. The question might well be raised as to whether or not results from this good land may safely be considered to apply to average land or lands that are poorer than the average. In Alabama, evidence is accumulating which sharply warns us against drawing sweeping conclusions for all kinds of soil, based on experiments conducted on a few kinds of soil.

A Few Examples

A few examples may be given to illustrate this point. Based on a number of cooperative experiments, our Agronomy Department concluded that mineral fertilizers were rarely needed for corn when it was planted in rotation with other crops which were fertilized. Experiments on our substations supported this opinion. Nevertheless, when the Experiment Station bought some very poor, rolling, sandy land and began to farm it, there was found a need for potash so great that corn almost failed without potash applications. In the Piedmont Section of Alabama, erosion has been severe, leaving only a thin surface soil. Accumulating evidence strongly indicates that on such land farmers receive very much smaller increases from given applications of fertilizer than are received from land not severely damaged by erosion.

These kinds of observations are

Cotton after 7 years of harvested peanuts. The peanuts were unfertilized; the cotton received 600 pounds per acre of a 6-8-8 fertilizer in 1939. What fertilizer will give satisfactory results under these conditions is not known at present and is a problem to be solved.

causing some of us to question pointedly how far it is safe to make recommendations for widely varying soil conditions, when the recommendations are based on trials conducted on land far above average productivity. These kinds of results should make the cautious investigator question whether or not he can safely recommend the kind and amount of fertilizer that is most economical for a large number of soils and soil conditions that are not represented in his field experiments. In the lower South, peanuts occupy an ever increasing acreage. A large part of the crop is harvested and sold. Farmers know that harvesting peanuts is hard on the land. What kind of fertilizer should be applied to a crop that follows harvested peanuts? Preliminary and unpublished evidence indicates that the agronomist is unprepared to give a real good fertilizer recommendation for such crops.

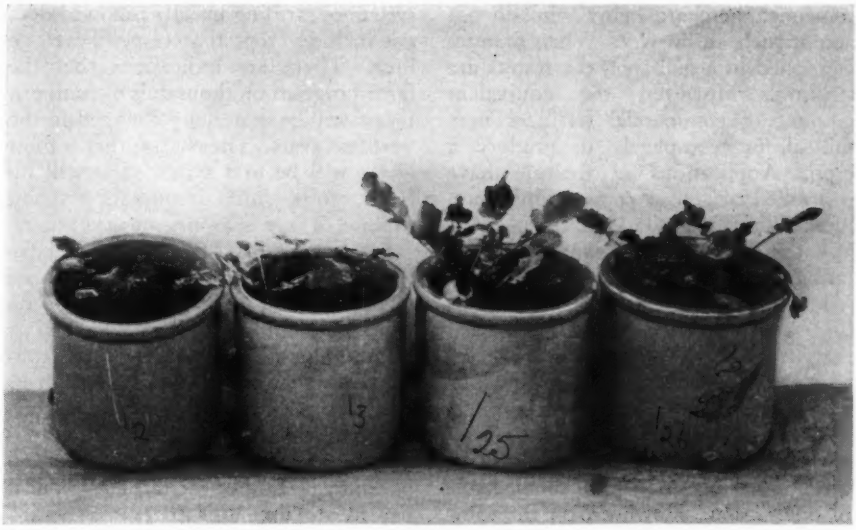
What About Rare Elements?

The usual fertilizer sold today is considered to be valuable chiefly because of the NPK elements contained. How long will this assumption stand? Without attempting to answer this particular question, it may be pointed out that when land is overlimed it may immediately develop a need for elements in addition to NPK. For certain crops, the evidence indicates that there are many sandy lands in the South that contain very small amounts of the so-called rare elements. The work of Doctor Sommer at the Alabama Station indicates definitely that the use of pure salts in a cropping system soon develops a condition where NPK alone is quite insufficient for crop production. Under greenhouse conditions, the need for some kind of so-called rare elements is developed after a few years intensive cropping in pots. The continued use of low grade fertilizer may incidentally supply most, or all, of these rare elements. On the other hand, the laws of economics and the production of synthetic materials are driving us toward the use of more concentrated fertilizers.

Doctor Tidmore of the Alabama Station has shown a possible saving of $115,000 annually in Alabama, if the grade of superphosphate now in use be increased from 16 to 18 per cent of phosphoric acid. Additional savings that might be made through the use of higher grades of other materials and of mixed fertilizers should make a total much greater than that which is possible from the use of higher grades of superphosphate. If concentrated fertilizer becomes more general, the agronomists should be prepared to state whether rare elements are needed and the amount that should be applied to make up the deficiencies in the various soil types. If and when the time comes when rare elements must be applied, the agronomists may be called on to advise the manner of application or the method of incorporating uniformly small amounts of material in the usual fertilizer so as to supply economically the rare elements in question.

It may not be considered strictly an agronomic problem, but the agronomists will be involved in finding an answer to the question that is sure to be raised as to the food and feed value of crops grown on land that is deficient in some of the rare elements. This rather extended discussion of the possible needs of rare elements in fertilizer should not mislead anyone to conclude that there may be an urgent need for their application in fertilizer now. This discussion is intended to bring out the possibility of the need for both extensive and intensive work in the future to answer questions along this line, which questions might be quite important when they develop.

Soil erosion and the ill effects of soil erosion are topics of discussion by a horde of agricultural workers. Funds available for study and control of soil erosion amount to a sum greater than that available for any other subject studied by experiment stations and the Department of Agriculture. Neverthe-



In the experiment on turnips shown above, all pots received the same amounts of nitrogen, phosphorus, and potash. The two pots on the left received purified salts, while the two on the right received purified salts plus traces of the minor elements including boron, zinc, and manganese.

less, it is probably true that we know less about soil erosion and methods of control than we do about many other agricultural problems. It is generally assumed that organic matter plays an important part in the control of soil erosion, but one would probably get a vague answer if one requested definite proof.

Who knows the function or the functions of soil organic matter? Who knows the possible importance of the part organic matter plays in stimulating biological activities in soil? To push this thought further, one might ask who knows the importance of biological activities? Is it not probable that we have been putting a disproportionate amount of emphasis on soil chemistry and more or less slurred over the possible importance of soil physics and soil biology?

Many of us possibly have seen great volumes of water flowing over bare soil without any evident erosion. In such cases, apparently the soil was held against erosion by some kind of organic growth. This is an observation and not a statement of fact. If it is found to be true, what part does active soil organic matter play under such conditions? Is soil organic matter important because it holds much water, or is it important because it helps conserve soil water? Or is it important because of its binding effect, or its value as food for soil organisms?

The Value of Organic Matter

Why are gall spots proverbially poor? Gall spots contain little or no organic matter. Soil in such spots may contain just as much mineral nutrients as in uneroded areas. Nevertheless, even with commercial nitrogen added, gall spots usually produce little or no crops. Usually the gall spots are the only ones on which a stand of crop fails. Does the gall spot suffer more from drouth than uneroded land? Someone may try to answer these questions, but if convincing evidence is asked for to back up the answer, it is extremely doubtful if such evidence would be forthcoming.

This leads to a question as to the possible value of barnyard manure. Is it valuable only for its NPK content? Even though this question may have been answered in the affirmative by

someone, there are many who do not accept such an answer. When manure is applied to a gall spot, the results are striking. However, the equivalent amount of commercial fertilizer may fail almost completely to produce a crop. Applications of manure have controlled root-rot of cotton, while commercial fertilizers had no effect on it. What is the value of organic matter in making mineral nutrients available?

Much work has been done along this line, but we do not have an answer that explains fully the results. For example, Scarseth, formerly of the Alabama Experiment Station, accurately determined that available phosphates when applied to bare soil in pots in the greenhouse became quite unavailable in one season. However, on the same soil in the field, a heavy application of phosphate has continued to give a splendid response 4 years after the application was discontinued. There is no definite explanation for the difference between the results obtained in the field and those obtained on bare soil in pots in the greenhouse. May we assume that this difference is due to the action of soil organic matter and plant roots and plant residues?

Liming Problems Arise

This discussion leads to still another question. If the changing agricultural conditions bring about an increase in grazing crops and more winter cover crops in the South, will there not need to be developed through experimentation another set of fertilizer recommendations for these changed conditions? If more crops are grazed on the land, might there not be a reduced need for mineral fertilizers and nitrogens? Might there not be needed a different ratio under such conditions from that needed under the present conditions where row crops largely prevail?

With the exception of certain small areas, practically all cultivated lands in the South are acid to some degree. However, liming is not generally practiced. This is due in part to the fact that the system of farming usually followed does not include crops that respond well to lime. There are indications that the farm program on thousands of southern farms will be materially changed in the next few years. The change that is most likely will be to a system that will include crops which frequently respond to lime. There is an urgent need, therefore, for a "quick test" that would determine where lime will pay. Note especially that emphasis is put on whether or not lime will pay. There may be a number of methods that will determine whether or not a sample of soil is acid to some degree. However, it is extremely doubtful if there are methods available now that answer the all-important question of the farmer, "Will it pay me to lime this particular field?" An example may illustrate this point. A number of years ago the Alabama Station established an experiment field in the Piedmont area. Chemical tests indicated the soil to be very slightly acid. Nevertheless, an application of lime nearly doubled the yield of cowpeas the first year. When it is understood that cowpeas are supposed to be an acid-tolerant crop, the complete failure of the chemical method in this case is evident.

As the type of farming changes in the South, important liming questions should be answered, such as, how much lime will be needed on a given soil under a given system of farming? Should small amounts be applied annually, or may large amounts be applied at infrequent intervals? Are small particles of lime actually washed into the subsoil when sandy soils are limed? On what soils may a reasonably pure calcium lime be applied, and where should a dolomitic lime be used? How much lime will different soils stand before overliming injury is obtained? All of these are practical questions that should be tackled now so that answers will be available when a changed type of farming in the South calls for such answers.

This leads to a brief discussion of

(*Turn to page* 38)

A typical scene on many farms in Caledonia County where areas of crop land can be worked into a rotated pasture system. In this case, 200 pounds of a 15-30-15 fertilizer per acre were used as a top-dressing.

Better Plans Increase Income from Farm

By T. H. Blow

County Agricultural Agent, St. Johnsbury, Vermont

AN increased amount of attention is being given by extension agents today to the economic problems of farm and agricultural people. During 1929 and the 5 preceding years, only some 5 per cent of an agent's time was needed to handle such work, but in 1933 this had increased to 13 per cent, and in 1937 the records show that agricultural economics and program planning work for the nation as a whole had jumped to some 22 per cent of the agent's time.

That one phase of this work (namely, farm records and their adapted uses) is important as a basis for county work is well illustrated in the findings of a survey taken in Caledonia County, Vermont, for the 12-month period ending September 30, 1938. The survey was made in conjunction with the economics department of the Vermont Agricultural Extension Service.

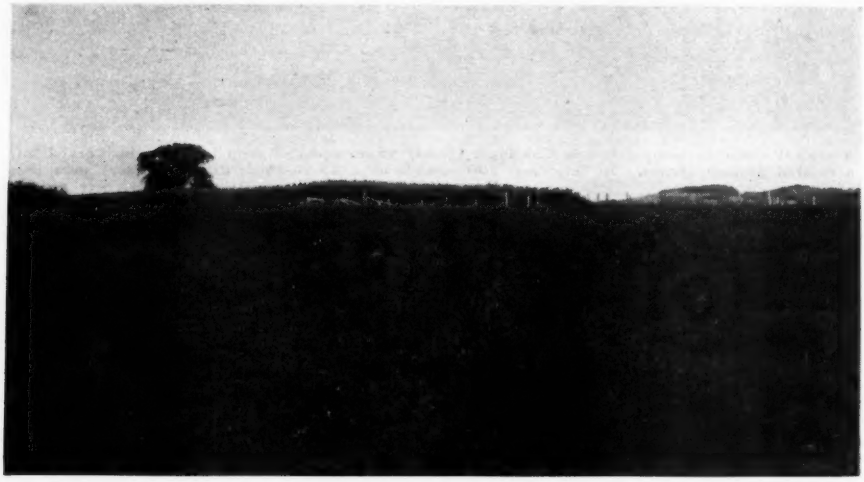
The information was taken on 30 farms and for the purpose of studying the organization and management of farms in the county and to determine the effect of sidelines on farm returns. The material included in the study is being used in extension teaching in the county, and farmers have a real advantage in knowing just what factors should be adhered to for the best success in their operations.

Caledonia County, due to its geographical location, is a hay and pasture area and will continue to be used principally for such crops. The total acreage of the county is 395,520 acres, of which 81 per cent is in farms; 102,176 acres is available for crops; and the

balance is used for pasture and woodland. This area has to be so handled as to provide the roughage and pasture for the some 23,000 dairy animals in the county.

With an average rainfall of 35 inches and a growing season of from 110 to 120 days, hay and pasture grasses thrive in all parts of the county, and corn for silage grows well. Farmers in the county for many years have been convinced of the value of plant food in both barnyard manure and commercial fertilizers for top-dressing and have only been curtailed in a much larger use of fertilizers by a shortage of income for such expenditures.

That additional plant foods are needed, is well indicated in the results of soil tests taken on a large group of farms a year ago. Of 913 samples taken in and covering every town and area in the county, 492 showed low in potash and 377 low in phosphorus. Experiment station studies show that nearly 85 per cent of the potash is in the liquid portion of the manure, hence, in many instances with poor facilities for taking care of this animal by-product, it becomes more and more necessary to supplement manure applications not only with phosphorus, but also with potash. Striking results have been obtained on demonstrations in the county with both these elements, and it is very fortunate for the farmers of the State as a whole that the 1940 Vermont Agricultural Conservation Program calls for an increased payment for potash. While phosphorus use as 16, 20, and 47 per cent has gone ahead by leaps and bounds and has proven its value, potash use should by the same token play a much larger part in producing better hay, pasture, and crops grown in the county. For top-dressing good hay fields and the better pasture sods, a 1-2-2 ratio fertilizer is proving most popular and returning a good interest on investment.



A first-year seeding of alfalfa on the farm of John Somers, West Barnet (one of the farms studied). Alfalfa is grown successfully on this upland farm of Calais soil type, but Mr. Somers seeds down with heavy applications of manure supplemented with superphosphate and extra potash.

Income from Soil Types Vary

The most common soil types found in the county were represented by two or more farms included in the study, and the labor incomes earned by farms situated in the various soil groupings are shown in table 1.

The term, labor income, is used to represent what a farmer receives for

TABLE 1—SOIL TYPES AND LABOR INCOME

Soil type	Number of farms	Labor income
Calais	2	$1,775
Greensboro	7	1,296
Berkshire	2	970
Worthington	7	876
Agawam	8	391
Other	4	475

his year's work above the interest on his investment and all farm expenses, and in addition to having a house to live in and products to use in the house. The average labor income on these 30 farms was $858.

In general, all the soils in Caledonia County which are used for agricultural purposes are quite productive. However, as brought out in the table, income from the different soil types does vary, because of the amount of crop and pasture land which might be available, and to some extent, because of the slight differences in the ease of working and the plant-food content of the various soil types.

As indicated in table 1, labor incomes were highest on the Calais and Greensboro soils. Calais, Greensboro, and Worthington soils are closely related. They make up the major portion of the agricultural land of the upland farming areas of Caledonia County. They are exceptionally good grass soils and are also suited to the production of potatoes. Most of the maple orchards of the State are incidentally located on one of these three soil types. These soils also respond readily to fertilizer treatments on respective crops.

The Berkshire soils are fairly productive, and farms on these soils have relatively high incomes, according to the study. The Berkshire type is also found in the upland farming areas. The Agawam soils are river valley soils and are of alluvial origin. Incomes on the farms with Agawam type were relatively low. This is accounted for by the fact that the area of tillable Agawam is usually small, and the size of the dairy business on these farms is correspondingly small. Size of business is an important factor in Vermont farming.

Increased Hay Yields

The average of the 30 farms studied had about one-fifth of the land in crops, two-fifths in open pasture, and two-fifths in woods and other land. In other words, those farms studied were typical of the county as a whole. In the matter of crops grown, the production of hay was all important, and is well illustrated in table 2.

It will be noted that the average yield for hay in all cases except alfalfa was very low, and much can be done with sound fertilization methods to improve this yield. As an indication of the

TABLE 2—LAND USE AND AVERAGE YIELD PER ACRE

Kind of Crop	Number of Farms Reporting	Average Acres per Farm Reporting	Average Yield per Acre
Corn for Grain	4	1.0	101.1 Bu. (cob)
Corn for Silage	22	6.4	12.8 Tons
Corn Fodder	2	3.5	7.1 "
Potatoes	12	1.1	146.3 Bu.
Oats, Grain	2	9.0	47.4 "
Oats, Hay	18	5.0	1.9 Tons
Alfalfa	1	5.5	5.0 "
Clover	16	14.1	1.5 "
Timothy	29	35.9	1.6 "
Other Hay	12	16.7	1.5 "

increase to be had from top-dressing with complete fertilizers, two tests with 8-16-16 used at 300 pounds per acre on two of these farms this past season showed 7.56 tons of green hay per acre as compared to 3 tons on the untreated area on one farm, and 6.95 tons on treated and 3.3 tons on the untreated area on the other farm. In these plots accurate yield figures and records were kept.

Size of Business Important

The most important source of income on these farms was the dairy, with an average of 20 head of dairy cows. The largest herd was 35, and 9 farms had less than 14 head. The average farm also kept 3 horses, 224 hens, 3 hogs, and 3 farms kept sheep. With these sidelines, poultry was the most important source of income. However, for comparison, the total value of cows per farm was $1,618 as compared to $252 for hens, with 48 per cent of the total income coming from dairy products, 19 per cent from livestock sales, and 11 per cent from eggs.

The size of business which a farmer operates is an important factor in determining his net return in any given year. Numerous farm management studies have indicated that there are certain favorable factors which usually accompany normal increases in the size of the farm business. Some of these are: increased efficiency in the use of labor and equipment, a greater number of units of production upon which a profit may be made, and often increased efficiency in marketing through having a large volume of a given product at a given time.

By having 20 cows and up per farm, a group of 10 farmers in the study had labor incomes of $1,070, as compared to 9 farmers keeping under 14 cows and having a labor income of $462. Other Vermont studies show an investment per cow of around $400 to be most efficient, however in this study those farmers having an investment of $488 per cow had an average labor income of $1,261, as compared to $502 where the investment went to $814 per cow. The average for the group was $633 investment per cow with an average labor income of $858. A good mark to adhere closely to is about two-thirds the investment in real estate, one-fifth in

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A permanent pasture on the Dopp farm in the town of Ryegate on a Greensboro type soil, where top-dressing applications of manure, superphosphate, and potash treatments have maintained a good clover pasture sod for the dairy.

Oregon Beets and Celery Need Boron

By A. G. B. Bouquet

Oregon Experiment Station, Corvallis, Oregon

THE use of boron has been instrumental within the past 3 years in correcting major troubles that have occurred in Oregon beet and celery fields. While these two crops are not produced on such an extensive scale as is the case in some other States, nevertheless considerable importance is attached to the growing and canning of beets, the principal canned root vegetable, and the production of celery for shipments within and out of the State.

Oregon ranks fourth in total tonnage of beets for canning, but stands first of all States in tonnage per acre. Beginning in 1919 with a pack of 3,618 cases, the annual pack now usually reaches 300,000 cases, or an estimated tonnage of 5,000 tons of roots, having a total value of approximately $100,000. The Northwest beet pack is conceded to be of unusually good color and high quality.

The major trouble of this crop up to within a year or so ago has been canker, the malady appearing as dark spots on the roots, usually on the part of the greatest circumference of the beet. It was late in the fall of 1931 when some of the first beets were sent in to the writer for examination, but it was not until 2 years later that the trouble became more or less general. Some roots may be very slightly affected with but one small spot of ½ to 1 inch in size. Other roots may have several spots to a degree where most of the root is blackened. Sometimes the canker or blackening may not be visible on the surface, but when the beet is sectioned the darkened areas are plainly seen, extending into the fleshy part of the root from depths varying from ⅛ to ¼ inch. As affected roots increase in size, the black spots frequently develop into growth cracks and large open cankers, extending in extreme cases to a complete girdle of the root.

Losses to grower and canner on account of blackened beets have occurred through dockage of funds for marketable beets, waste of material in handling affected roots, and extra labor involved in the factory in removing cankered areas. Two rejected fields were observed in 1937, and one large planting in 1938 was docked $5 a ton or $35 an acre for removal of canker at the cannery.

Boron Controls Beet Canker

One cannery fieldman estimated that 3% to 4% of all beets delivered by growers were sorted out and rejected because of the canker. Also growers left in the fields probably 5% or more of their crop due to this trouble. This estimate is based on all deliveries, but the canker probably reached as high as 30% to 40% of the crop in some bad fields. In addition to these losses experienced by the growers, there have always been some beets affected that could not be detected on the sorting belt but which showed up black after peeling. This necessitated extra hand paring in the preparation room as well as extra sorting and general supervision. Also most of the pared beets became unsuitable for packing whole because of irregular shape and had to be put into a lower grade, such as a diced pack.

Beet canker has been identified in plantings on numerous types of soils and under greatly varying degrees of soil moisture. On these soil types at one time or another, beet canker has been prevalent in varying percentages of roots affected. In some instances the damage has been slight. In extreme cases fields have been so badly affected as to have no beets harvested at all.

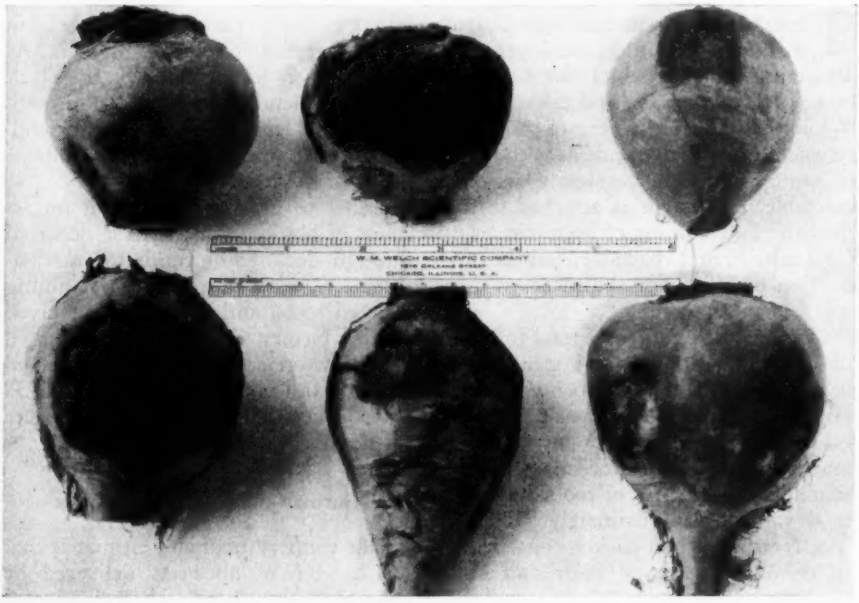
Both early and late plantings have been affected. Irrigated fields of beets seem to have suffered less than unirrigated areas, although there have been several instances observed where beets were badly cankered in the presence of ample soil moisture, and conversely no canker appeared sometimes in fields that dried out badly and in which the beets were small.

Greenhouse experiments were conducted by Dr. W. L. Powers, Soil Scientist, Oregon Experiment Station, in which two types of soil were used where beet canker had been prevalent. These soils received a general fertilizer containing nitrogen, phosphorus, and potash, as well as low, medium and high supplies of boron, moisture, and potash.

Canker developed in beets not treated with boron. It was not prevented by a good supply of moisture or potash. Liming increased canker or decreased boron availability. As little as 10 pounds of boric acid an acre, however, under controlled conditions prevented canker and caused striking increases in yield.

Following the control of canker in the plant house tests, three rates of application of boric acid were made in field trials as well as treatments with other minor elements. In this treatment the boric acid was not applied before seeding but some 48 days before the time of harvesting the roots. On the Newberg sandy loam of Charles Hart's farm at Jefferson, 30 pounds of boric acid per acre reduced the canker to 4%. When no boron was applied, 73% of the roots were affected by the canker.

On the East Farm Experiment Station vegetable gardens at Corvallis, five individual plots treated with 20 pounds



External view of beet canker, a disease causing serious losses to grower and canner.

of borax per acre yielded 85% of roots free from canker, 10½% having a very slight canker, and 4½% having medium to heavy cankering. One of the five treated areas produced 92% roots free from canker. Most of the roots that were affected in the treated areas had but a slight degree of blackening. In the untreated areas a mean of 23% of the roots were free from canker, 36% had a mild degree, while 40% had medium to heavy cankering.

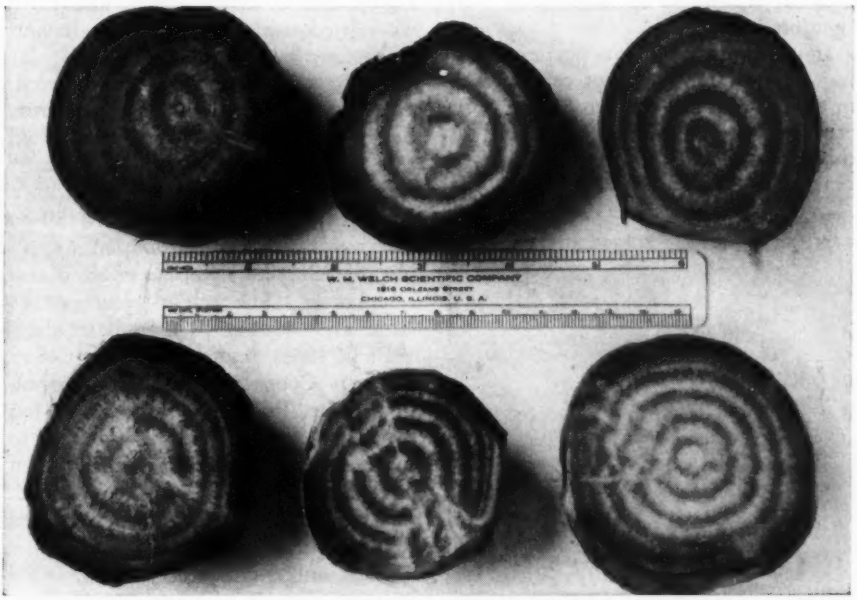
In the treatment of the plots at Corvallis the borax was mixed with 500 pounds of a 4-16-8 fertilizer per acre and broadcast over the area previous to seeding.

In the current season of 1939, 15 pounds of borax per acre mixed with ammoniated phosphorus reduced the per cent of canker to a little over 1%, while the same fertilizer without the borax yielded 16.3% of cankered roots.

The greatest amount of commercial borax that has been applied per acre in the beet experiments has been 45 pounds with the exception of the second planting of beets on the same ground during the past summer. This 45-pound plot, used for the first crop of beets, received an additional 50 pounds of borax per acre for a second crop of beets raised on the same ground following the harvesting of the first crop. There was no canker in this Plot No. 4 to which the heavy application of borax was applied, neither was there any toxicity to the beet plants or roots. The heavy application on this plot was made for the purpose of studying the effect of the boron on the epidermis of the root.

The reduction of beet canker has eliminated extra work in dealing with the segregation of blackened roots to the extent that in one factory there was an increased efficiency of 75% in the rapidity with which the roots were put through the process of packing. On the contrary, in another establishment where beets were received from fields in which there had been no boron applied, the rate of pack was decreased 37% of normal.

It has been estimated conservatively that the preventable gross loss in yields



Section of beets showing penetration of canker. (Same roots as in external view.)

of 5 to 7 tons of beets per acre on 500 acres affected during any of the last few years is from $5,000 to $7,000.

Boron Controls Celery Crack

Celery is one of Oregon's leading vegetable crops, grown not only for local market but for shipment to other States. The number of carlots of celery shipped annually from the State has been for several years about 500, close to a value of approximately $250,000. Some 20 or more States from Washington, D. C., to Florida as well as all west and midwest points receive Oregon celery in carlots. The crop is grown on peat land as well as on sandy and silt loam soils. A considerable amount of fertilizer, both manure and commercial, is applied to celery soils. Irrigation is essential.

In common with the appearance during the past few years of celery crack in eastern and midwestern States, western growers have also complained of this trouble, particularly during the years since 1936 and 1937.

A celery plant dwarfed because of stem crack.

Paul Oman of Milwaukie, Oregon, had his first experience with celery crack in 1933 and was unable to account for the condition of his crop. In 1934 this grower lost all of his early celery from the cracked stem trouble and wrote to the Oregon Experiment Station for suggestions. The soil was analyzed and found to be rather highly alkaline, but this condition was remedied without any improvement in controlling the crack. The 1935 celery crop was about a 75% failure. In the spring of 1936 this grower was sent some borax and applied 10 pounds of the material per acre for his late celery.

In Mr. Oman's words: "We found that our late celery which we treated with 10 pounds of borax to the acre was almost free of celery crack, and since we started using borax we are having no trouble with this crack. This year only about 100 bunches were affected, and they were still good for hearts. Formerly when the outside leaves had cracked stems, the inside of the heart stems were found to be affected with a disease. Last season I applied 30 to 35 pounds of borax per acre on a small plot of celery to note the effect of excess borax. The celery grew just as large and healthy as anywhere else."

R. E. Jones, manager, Labish Celery Growers' Cooperative Association, shippers of the "Pride of Labish" celery, has stated, "We have had this trouble to some degree ever since we have been growing celery in the Lake Labish district. It has usually been confined to very small spots, but sometimes it spreads out over larger patches. One grower here last year lost over an acre of celery due to celery crack. Since that time many hundreds of pounds of borax have been used by these growers on their land. Three thousand pounds of borax were used on the Lake this year with very gratifying results."

On the Hayes Brothers farm the untreated celery has been badly affected, while the treatments with borax have

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Watermelons Bring Cash to Mississippi

By F. J. Hurst

Agricultural Extension Service, State College, Mississippi

WATERMELONS, famed for their delicious flavor and unsurpassed eating qualities, and long grown on nearly every farm in Dixie for home consumption, are now playing a dual role in Mississippi. They are rapidly becoming an important source of cash income in this State. Commercial acreage in watermelons in Mississippi jumped from an average of 1,640 for the 1928-32 5-year period to 9,800 acres in 1939.

The States which produce the bulk of commercial watermelons in order of their importance are: Georgia, California, Texas, South Carolina, Mississippi, North Carolina, Alabama, Virginia, Oklahoma, and Kansas. Principal watermelon-producing areas in Mississippi are in Smith, Covington, Simpson, Jones, Forrest, Stone, Harrison, and Yalobusha Counties.

Use Good Cultural Methods

To produce high yields of quality melons at the lowest cost, Mississippi producers are selecting suitable, disease-free soil, planting seed of improved varieties in market demand, applying liberal quantities of a high analysis fertilizer, practicing the best methods of cultivation, and correctly grading, loading, and marketing. Where producers ship cooperatively as is customary in most areas, it is necessary that they plant the same variety and on the same dates, in order that quantity lots of uniform melons may be available for marketing.

Like other crops, cash returns on watermelons depend on the production obtained and prices received. Production costs vary with conditions, but a comprehensive survey made by horticultural specialists in southern producing areas during the years 1929-32 showed that production costs averaged about $20 an acre. Of this amount, 42 per cent was spent for fertilizer, 17 per cent for man labor, 13 per cent for mule power, 13 per cent for rent, and the remainder for seed, interest, manure, motor truck, and machinery expense.

In 1939 growers in Stone County, Mississippi, who have been producing melons on a commercial scale for about 5 years, marketed 91 cars of watermelons. County Agent J. E. Snowden reports that producers sold from $15 to $75 worth of melons per acre. Part of the variation in per-acre income was due to weather conditions which were less favorable in some areas than in others.

Snowden said one farmer grossed $750 from 10 acres. His cash production and marketing costs included $120 for fertilizer and seed, and $80 for hauling, leaving a net return of $550. Another producer sold $816 worth of melons from 15 acres. His cash expenses for fertilizer, seed, and hauling totaled $275, leaving a net return of $541. Snowden said, "Stone County farmers made more money out of watermelons than from any other crop." The county is located in the Gulf Coastal plain.

In Smith County, M. M. Sullivan of Mize in 1939 sold $1,920 worth of melons from 32 acres. His expenses were $960. G. W. Luckey, Mize, had

One of the top floats at the Simpson County watermelon festival carried this bevy of beautiful girls and delicious melons.

13 acres in melons. His sales totaled $500; expenses, $130. J. D. McAlpin, Mize, had 6 acres in watermelons. His sales totaled $106; expenses, $51. A. P. Buckley, Taylorsville, netted $70 on 3 acres. His gross return was $95; expenses for fertilizer, seed, and other items, $25. He estimated unfavorable weather reduced his returns around $100.

After citing these and other records, County Agent Joe Taylor of Raleigh said, "Producers of Smith County annually net $20 to $30 per acre from watermelons. On an average watermelons return a little more profit than cotton."

Popular Varieties

Of the eight main commercial varieties—Cuban Queen, Tom Watson, Stone Mountain, Alabama Sweet, Irish Gray, Thurmond Gray, Augusta, and Florida Favorite—grown in the South, Dixie or Cuban Queen leads in acreage and production in Mississippi. The Cuban Queen is popular with Mississippi producers because it is very prolific, produces a large number of marketable melons, withstands either dry or wet weather, does not readily sunburn, and ships well. Most markets prefer this variety as the meat is red, tender, sweet, and juicy, and the quality in all sizes is usually good.

Producers consider selection of suitable soil free of disease so important in production of watermelons that they frequently will clear new land for this crop. New ground soil is usually full of humus and free from weed seeds. Ideal soils are well drained, full of humus, highly fertile, moderately to slightly acid sandy loams. Humus may be supplied by applying manure or by growing and turning under green manure crops. However, in fields where Fusarium wilt is present, since manure spreads the fungus which causes this disease, humus should be supplied only by growing green manure crops.

The seed bed is usually prepared by plowing 6 to 8 inches deep and harrowing until the soil is finely pulverized. Harrowing at frequent intervals before planting conserves moisture and helps to control weeds.

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Potato Fertilization in Michigan

By C. E. Millar

Head, Department of Soils, Michigan State College

POTATOES require a fertilizer of high potash content, according to the results of experiments conducted by the Michigan Experiment Station during the past 16 years and reported in Special Bulletin No. 299. Potato growing is a major farm enterprise in Michigan, as its 1937 ranking of first among the States in acreage and third in total yield well indicates. Although there are centers of potato production in the State, the crop is grown in every county, and since some 81 per cent of all the farmers grow potatoes, according to the 1935 census, the question of how to produce the largest yield of high quality tubers is a live topic of discussion in most farmer groups. Also the income from the lowly spud is not to be treated lightly. Farmers realized around $15,293,000 annually from the crop for the 1926-1935 period.

The average acre yield of potatoes for Michigan is not high, being 92 bushels for the 1926-1935 period. Possibly no higher yield could be expected for a crop grown over such a wide variation of soil and climatic conditions as is found in a State ranging in latitude from the northern tip of Maine to Providence, Rhode Island, and extending from St. Louis on the west to east of Columbus, Ohio. Michigan does have its 300-bushel potato club, however, and yields of 500 bushels or more per acre are obtained.

Potatoes growing on the better loam and sandy soils are greatly benefited by fertilizer containing approximately half as much potash as it does phosphoric acid. On the more sandy soils, the potash content should equal the phosphoric acid content. Center rows were unfertilized. Those to the left and right received 4-16-8 fertilizer.

The high plant-food requirements of potatoes are recognized by Michigan growers, and commercial fertilizer is commonly used for the crop. The quantity of fertilizer applied is undoubtedly reduced because of the supply of manure available. Most potato growers also keep dairy cows, and a large share of the manure produced is applied in preparing the soil for potatoes. Many farmers prefer rotted manure for potato fertilization, since fresh manure may increase damage from a light soil infection of the scab organism, particularly if the manure were applied late. The heavy loss of nutrients and organic matter which occurs during the rotting process is considered too great a sacrifice by most farmers, and hence they apply the manure fresh from the stable or storage pile, minimizing any increased scab damage by making the application several months before planting time. Commercial fertilizer may well be used in conjunction with manure to supplement the plant-food supply. This is well shown by the following results obtained on the Rossman farm in Montcalm County:

Manure	Fertilizer	Bushels of potatoes per acre	Increase due to treatment
None	None	119	0
8 tons	None	232	113
8 tons	2–12–6, 500 lb.	280	161
None	2–12–6, 500 lb.	228	109

Michigan potato growers use high analysis fertilizers, a large proportion of which contain from 20 to 28 per cent of plant food, with an appreciable number running to 36 per cent. The potash requirement of the potato crop is emphasized by the fact that 150 bushels of potatoes contain approximately 45 pounds of this nutrient, or six times as much as 25 bushels of wheat and four and one-half to five times as much as 50 bushels of oats. Years of experimental work by the soils section of the Michigan Experiment Station have shown that a fertilizer should contain from one-half to as much potash as phosphoric acid for Michigan soil conditions. On the heavier soils, such as the heavy sandy loams and loams, the lower proportion of potash is satisfactory, but on the lighter sandy loams potash content should equal phosphoric acid content. In some cases higher proportions of potash may result in somewhat increased yields, but failure to mature properly by digging time, with resulting damage in digging and poor keeping quality, renders the use of so much potash inadvisable as a general rule. Results of experiments, including 800 plats on 70 farms in the State, have led to the recommendation of grades, such as 4-16-8 and 3-12-12, for the potato crop in Michigan.

Soil Moisture Is Big Factor

Much consideration has been given to the rate of fertilizer application which can be depended upon to give profitable increases in yield of potatoes over a period of years. Inadequate soil moisture supply materially limits yields in some portions of the potato-growing regions virtually every year, and unquestionably plays a part in controlling yields over the major part of the producing area every year. The average annual precipitation in the sections of the State contributing most generously to the potato harvest is from 30 to 32 inches, although in some instances it falls to 28 inches. Fortunately the heaviest monthly rainfall comes in June, July, and August. In very dry seasons fertilizer has been found to contribute little toward increased yields, although

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PICTORIAL

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LAND DESTROYED BY GULLIES

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A scene in Nebraska before and after trees were planted for gully control.

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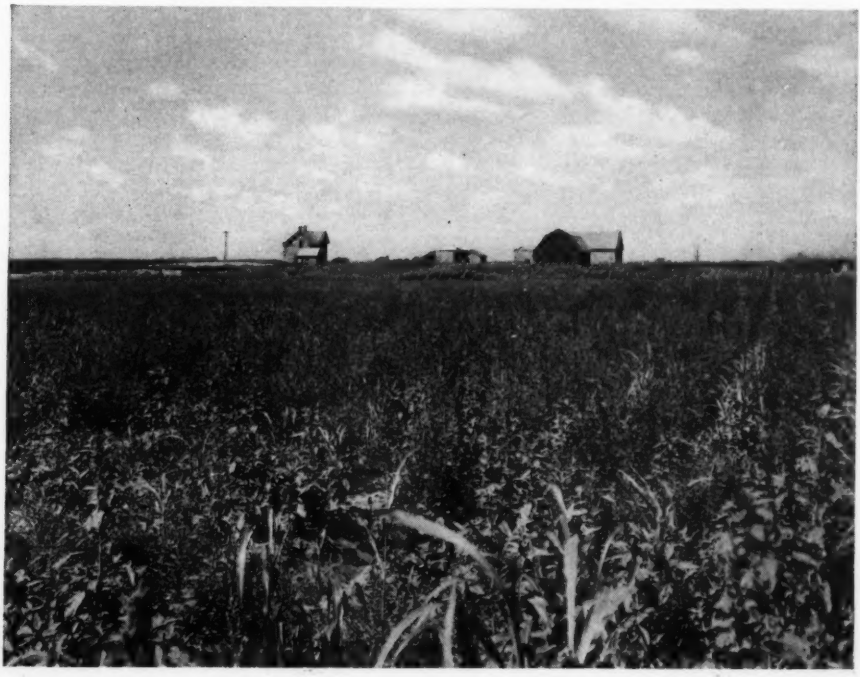
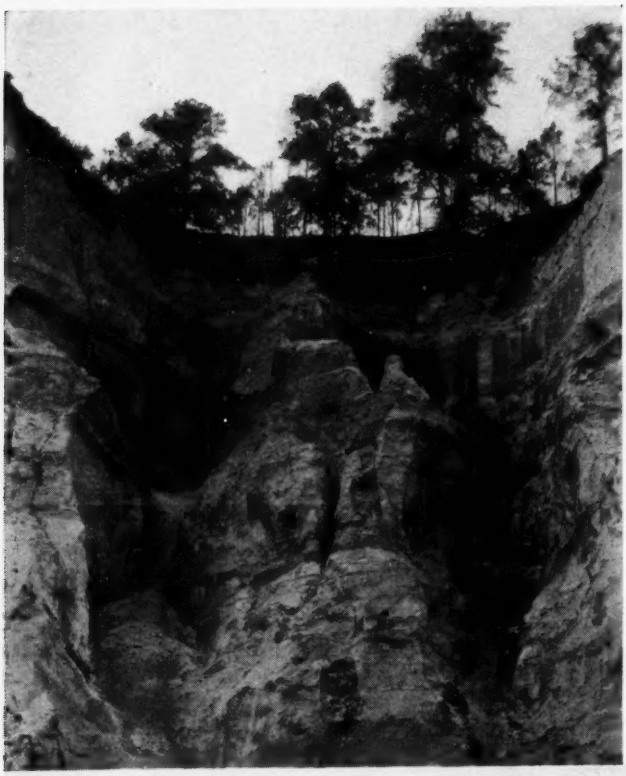
In South Dakota, showing effectiveness of Sudan grass for erosion control.





Left: This gully in Georgia spread to within 100 yards of a public school.

Below: Here, erosion was completely controlled by kudzu vines, second year growth.

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The Editors Talk

Looking Ahead

If natural economic forces were wholly responsible for the business situation in the United States, the outlook for 1940 would indeed be bright. Prospects include a high rate of industrial activity, improvement in employment and urban income, a broader farm market resulting in higher prices, and a continued improvement in agricultural income. However, one must recognize that the most discouraging aspect of our present situation is the fact that a part of the acceleration in business activity which has already taken place and of the improvement expected during the coming year must be attributed to the increased destructive consumption resulting from the European situation.

In the early stages of the present European conflict, because of the anticipated increase in consumption that might result, there was considerable discussion about the advisability of relaxing restrictions on American agriculture and perhaps permitting increased acreages in many instances and thus increased production. However, judging from the referendums on marketing quotas and acreage allotments on cotton and tobacco, which were held late in the last quarter of 1939, the farmers are still very much in the mood for production control. Subsidies which will be received as a result of the farm program in 1940 will depend largely upon the money available, but in view of the enthusiastic response that farmers have shown for their farm program, the AAA probably will be continued through 1940 in essentially its present form, and the Government will continue to augment the farmers' income with adjustment payments.

It has been noted, and properly so, that prices of farm products may not increase in proportion to prices of non-farm commodities and that the ratio of farm prices to prices paid by farmers will not be as favorable from the farmer's viewpoint in 1940 as in 1939. The reason for this is the burdensome supplies of many of our leading farm commodities and the prospects for good volume of production. However, any increase in prices is almost always beneficial to the farmer because of the relatively high percentage of fixed charges which make up his expenses.

It is anticipated that cotton prices will average higher in 1940 than in 1939 in spite of the fact that production and supplies will be as great as last year. An increase in domestic consumption is expected and there is no doubt at this time that exports in 1939-40 will be greater than in the year previous.

The two crops which probably will be most adversely affected by the present world disorder are tobacco and fruit. Tobacco production in this country was unusually heavy during 1939. In the flue-cured area, with production about 2,000,000 lbs. in excess of anticipated disappearance and the withdrawal of foreign buyers from our American market, prices receded sharply, cluttering the tobacco outlook for the coming year. However, up to the present time, both the producers of burley and flue-cured have adopted marketing quotas, agreed to acreage restrictions, and are reasonably assured of fair income.

The potato outlook is good. There probably will be an increase in acreage

and, because of greater consumer purchasing power, an increase in income from potatoes. In general, the same applies to truck crops. Producers of these crops can look forward to a year of good demand with fair prices.

The wheat situation has been affected somewhat by reports of drought and unfavorable weather in the Great Plains wheat-producing sections, and this coupled with prospects of increased world consumption of American wheat has carried wheat futures to levels approximating $1 a bushel. In the eastern sections of the United States, farmers still have fair possibilities of a favorable wheat crop. In the livestock sections of the country, the outlook for 1940 includes the possibility of reasonably favorable prices with an increase in demand offset to some extent by indications that livestock numbers are higher and that production will be greater. Feed supplies are adequate and the ratio between feed prices and livestock prices, while not as favorable as a year ago, is still advantageous.

With these prospects for an increase in prices and a possible increase in the production of many of our leading cash crops and livestock products resulting in a higher farm income for 1940, it seems that the farmers of the United States have much to be thankful for.

G. J. Callister Resigns

It is with great regret that in this issue we must announce the resignation of G. J. Callister, Vice President and Secretary of the American Potash Institute since its formation in 1935. His future residence will be in Canada where he plans to render whatever service is possible, in a civil capacity, to help his country in the current war.

Mr. Callister is well-known to a large number of our readers through his contributions to the magazine since its inauguration as BETTER CROPS in September 1923 and through his many years of personal contacts with agricultural officials, extension forces, and members of the fertilizer trade. He first came in contact with the potash industry by conducting cooperative fertilizer experiments while teaching in Massachusetts in 1910. In 1911 he accepted a permanent position with the potash industry in Baltimore, and except for war service in France and Belgium and post-graduate work at Cornell University, he has been connected with the agricultural and scientific work of the potash industry since that time.

Intensely interested in agronomic and economic problems, Mr. Callister contributed to the early development of short chemical methods of testing soils and plants for nutrient deficiency, to research on economic factors affecting changes in fertilizer consumption, and to the publication and content of industrial journals, both agricultural and economic. He has been on the National Joint Committee on Fertilizer Application since its inception, was a member of the Plant Research Committee, and has been associated with agricultural research projects, in cooperation with State Agricultural Colleges and Experiment Stations, in all parts of the United States and Canada where fertilizer is or might be used. He is a member of the American Chemical Society, American Society of Agronomy, International Society of Soil Science, Soil Science Society of America, Canadian Society of Technical Agriculturists, and of the parent chapter of the Honorary Scientific Society of Sigma Xi at Cornell University.

In the important field of successfully relating agricultural and scientific work to the solution of industrial problems of fertilizer usage and consumption, Mr. Callister has always stood for industrial cooperation with Federal and State agricultural authorities and for cooperation between the several fertilizer industries. He has done much to bring the work of the scientists to the industry and to make the problems of the industry better understood among the scientists.

REVIEWS

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture, the State Experiment Stations, and Canada, relating to Fertilizers, Soils, Crops, and Economics. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.

Fertilizers

¶ Results obtained from extensive pasture investigations with regard to the use of fertilizer and lime are reported by Dr. James Tyson in Michigan Experiment Station Technical Bulletin 167, "Use of Fertilizers and Lime on Native Pastures in Michigan." Among these results was noted an approximately 100 per cent increase in the average acre yields of pasture forage by applications of 500 pounds of fertilizer, such as 10-6-4, 10-12-4, and 10-10-5. The grass produced on the fertilized pasture was found to be more succulent and contained a higher percentage of crude protein than grass from the unfertilized pasture.

Since the livestock load which a farm can support is based upon the year-round supply of feed produced, a season-long pasture of palatable, nutritious forage is an important part of the yearly feed supply. The grazing seasons of native grass pastures is limited to the months of May, June, and September, which means that the production of forage on them should be complementary to that from other sources, such as permanent legume pastures, temporary or annual pastures, or grazing the aftermath on leguminous meadows.

Therefore, if the feed requirement of the livestock load during the spring, early summer, and fall period is such that increased pasture is needed the use of complete fertilizers will, according to the author, about double the acre yields of grass. A few areas in the State where sufficient clover growth is encouraged by phosphatic and potassic materials may not require nitrogen in the fertilizer.

¶ Prepared to assist farmers in such problems as kinds and amounts of fertilizers to use for crops in New Jersey, the State Agricultural Experiment Station Circular 398, titled "Fertilizers for New Jersey," suggests fertilizer grades and liming practices that will cover nearly all situations where mixed fertilizers are to be used. The grades recommended are: 5-10-5, 5-10-10, 7-7-7, 4-12-4, 4-12-8, 4-16-4, 3-12-6, 3-12-15, 0-14-7 and 0-12-12. Owing to the wide popularity of the 5-8-7, 4-8-8, 4-8-10 and 2-8-10 analyses, it is interesting to note that the Station officials consider these four grades acceptable, however, comparable ratios may be obtained in the 10 grades listed above. In addition to the mixed fertilizers, certain fertilizer materials, such as superphosphate, muriate of potash, and various nitrogen carriers, are listed.

Also described in the circular are the analyses best adapted to certain crops under different soil conditions, including lawns, shrubs, and shade trees, with specified rates of application. Very good advice on how to get the most from fertilizers is briefly summarized on the last page under seven headings.

"Timely Fertilizer Facts for North Carolina Farmers," Agr. Exp. Sta., Raleigh, N. C., Agron. Inf. Cir. 118, April 1939, C. B. Williams.

Soils

¶ One of the most serious problems in establishing a permanent agriculture in West Virginia is the control of soil ero-

sion, according to R. J. Friant in West Virginia Extension Circular 322, "Reorganizing the Farm for Efficient Land Use." Farmers are becoming aware of the heavy toll erosion is taking from cultivated fields and even from pastures which have become unproductive. In reorganizing their farms, the progressive farmers recognized that erosion control methods including proper crop rotations, strip cropping, and the use of systematic liming and fertilizing practices according to State recommendations play an essential part in efficient land use. Instructive information on all these important points is given in the circular.

The first thing to consider in laying out a farm for efficient land use and erosion control is the topography. Land with a slope greater than 25 per cent should not be used for cultivated crops, the author advises, and land having a slope of 25 to 40 per cent, if not too stony or broken to be practically limed and fertilized, might be used for permanent pastures. Rough land and land with a slope greater than 40 per cent should be left in timber and all livestock fenced out.

Clover or alfalfa ought to appear in the rotation at least every third year. In fact, one-third or more of the tillable land should be in clover or alfalfa all the time to maintain the organic matter and nitrogen content of the soil and also to prevent erosion. The soil treatment suggested for each rotation should at least help to maintain soil fertility.

"Factors Influencing the Availability of Native Soil Phosphate and Phosphate Fertilizers in Arizona Soils," Agr. Exp. Sta., Tucson, Ariz., Tech. Bul. 82, Sept. 15, 1939, W. T. McGeorge.

"Irrigating a Prairie Farm Garden," Dom. Exp. Sta., Lethbridge, Alberta, Pub. 657, Cir. 145, Oct. 1939, W. H. Fairfield.

"Stark County Soils," Agr. Exp. Sta., Urbana, Ill., Soil Rpt. 64, June 1939, Eric Winters, Jr., R. S. Smith, and L. H. Smith.

"Boone County Soils," Agr. Exp. Sta., Urbana, Ill., Soil Rpt. 65, June 1939, Herman Wascher, R. S. Smith, and L. H. Smith.

"Shelby County Soils," Agr. Exp. Sta., Urbana, Ill., Soil Rpt. 66, June 1939, Herman Wascher; Guy D. Smith, and L. H. Smith.

"The Value of Legumes for Soil Improvement," Agr. Exp. Sta., State College, Miss., Bul. 336, Aug. 1939, Russell Coleman.

"Soils of Musselshell County," Agr. Exp. Sta., Bozeman, Mont., Bul. 374, Aug. 1939, L. F. Gieseker.

"The Effect of Irrigation and Cropping on Desert Soils," Agr. Exp. Sta., State College, N. M., Tech. Bul. 263, May 1939, C. W. Botkin and L. B. Shires.

"Iodine in Texas Soils," Agr. Exp. Sta., College Station, Brazos County, Texas, Bul. 579, Oct. 1939, G. S. Fraps and J. F. Fudge.

"On Tired Soil," A.A.A., U. S. D. A., Washington, D. C., PC-3.

"Soil Survey, Decatur County, Iowa," U. S. D. A., Washington, D. C., Series 1935, No. 7, April 1939, A. W. Goke, E. R. Webster, and D. F. Moine.

"Soil Survey, Frontier County, Nebraska," U. S. D. A., Washington, D. C., Series 1935, No. 9, April 1939, S. R. Bacon, E. H. Tyner, W. L. Bruce, David Franzen, and D. B. Dodson.

"Soil Survey, Grafton County, New Hampshire," U. S. D. A., Washington, D. C., Series 1935, No. 6, April 1939, W. J. Latimer, M. H. Layton, W. H. Lyford, W. H. Coates, and P. N. Scripture.

"Soil Survey, Logan County, Ohio," U. S. D. A., Washington, D. C., Series 1933, No. 29, June 1939, John T. Miller, Arthur E. Taylor, and W. E. Tharp.

"Soil Survey, Murray County, Oklahoma," U. S. D. A., Washington, D. C., Series 1935, No. 8, May 1939, E. G. Fitzpatrick, L. E. Rose, and W. C. Boatright.

Crops

¶ An appropriate time to apply fertilizer to the home orchard in South Carolina is during late February or early March when moisture supply is abundant, according to A. E. Schilletter in Extension Bulletin 89 entitled, "The Farm Orchard." This would promote better growth and cause less injury than is usually encountered by late applications. For bearing orchards in South Carolina the 4-8-8 or 7-7-7 fertilizer at the rate of around 500 pounds per acre would probably be sufficient if the soil is not too low in fertility. If the foliage is yellow and growth is poor later in the spring, an additional light application of available nitrogen might be desirable and a supplementary application of potash might also be given as special conditions warrant. Trees or vines just set out would require not more than 100 or

200 pounds per acre due to the danger of fertilizer injury to the young stock, but the amount should be increased from year to year as the trees or vines grow older.

The author points out that a small orchard is a paying proposition for every farm. Such fruits as peaches, plums, grapes, strawberries, dewberries, and blackberries produce well in all sections of the State. Apples and cherries are less adapted, yet on farms in South Carolina apples are found successfully growing. Farmers who are unprepared to carry out a satisfactory spray schedule will find pecans, pears, figs, and the small vine fruits most suitable. The circular lists the varieties of fruits recommended and gives instructions on selecting the site, planting, and care of the farm orchard. A handy spray calendar giving full details of the required measures is appended.

"Growing Grapes for Home Use," Dom. of Canada, Dept. of Agr., Ottawa, Canada, Pub. 664, Cir. 147, October 1939, F. S. Browne.

"Production of Quality Tomatoes in Eastern Ontario," Dept. of Agr., Toronto, Ont., Bul. 404, April 1939, C. E. Mighton.

"Colorado Farm Bulletin," Agr. Exp. Sta., Fort Collins, Colo., Vol. 1, No. 4, Oct.-Dec. 1939.

"Diseases of Beans in Southern Florida," Agr. Exp. Sta., Gainesville, Fla., Bul. 336, Sept. 1939, G. R. Townsend.

"Georgia Farms Go Forward!," Agr. Ext. Serv., Athens, Ga., Bul. 470, 1938 Annual Report.

"A Ten Point Program for Small Farmers in Hawaii," Agr. Ext. Serv., Honolulu, Hawaii, Cir. 13, Nov. 1939, H. H. Warner.

"Commercial Strawberry Growing in Kentucky," Agr. Ext. Serv., Lexington, Ky., Cir. 295, Rev. May 1939, W. W. Magill.

"Annual Report of the Maine Extension Service for the Year Ending June 30, 1939," Agr. Ext. Serv., Orono, Maine, Bul. 267, Nov. 1939, A. L. Deering, Director.

"How to Grow Sweet Corn," Agr. Ext. Serv., Orono, Maine, Ext. Bul. 269, Dec. 1939, Oscar L. Wyman.

"Fruit Notes," Agr. Ext. Serv., Amherst, Mass., Nov. 1939, W. H. Thies.

"The Massachusetts Commercial Vegetable Grower," Agr. Ext. Serv., Amherst, Mass., Vol. 21, Nov. 1939.

"The Quarterly Bulletin," Agr. Exp. Sta., East Lansing, Mich., Vol. 22, No. 2, Nov. 1939.

"Soybeans in the Yazoo-Mississippi Delta," Agr. Exp. Sta., State College, Miss., Bul. 331, June 1939, H. A. York.

"Small Grain Production in the Yazoo-Mississippi Delta," Agr. Exp. Sta., State College, Miss., Bul. 334, Sept. 1939, Roy Kuykendall.

"Propagating and Growing Plants with Electric Heat," Agr. Ext. Serv., State College, Miss., Ext. Bul. 106, June 1939, F. M. Hunter and R. O. Monosmith.

"Mississippi Farm Research," Agr. Exp. Sta., State College, Miss.. Vol. 2, No. 12, Dec. 1939.

"Soybeans in Nebraska," Agr. Exp. Sta., Lincoln, Nebr., Bul. 322, Oct. 1939, T. A. Kiesselbach and W. E. Lyness.

"Annual Report of the Board of Control for the Fiscal Year Ending June 30, 1938," Agr. Exp. Sta., Reno, Nev.

"Fifty-ninth Annual Report of the N. J. State Agr. Exp. Station and the Fifty-first Annual Report of the N. J. Agr. College Exp. Station for the Year Ending June 30, 1938," Agr. Exp. Stas., New Brunswick, N. J.

"Serving New Hampshire Farms and Homes" Agr. Ext. Serv., Durham, N. H., Ext. Bul. 56, May 1939, An. Rpt. for 1938.

"Strawberry Culture," Agr. Ext. Serv., Cornell Univ., Ithaca, N. Y., Bul. 404, March 1939, M. B. Hoffman.

"Report of the North Carolina Department of Agriculture from July 1, 1936, to June 30, 1938," N. C. Dept. of Agr., Raleigh, N. C.

"Bimonthly Bulletin," Agr. Exp. Sta., Fargo, N. Dak., Vol. II, No. 2, Nov. 1939.

"The Bimonthly Bulletin," Agr. Exp. Sta., Wooster, Ohio, Vol. XXIV, No. 201, Nov.-Dec. 1939.

"Some Observations on Fifty Years of Ohio Weather," Agr. Exp. Sta., Wooster, Ohio, Bul. 608, Nov. 1939, C. A. Patton.

"Grapes in Oklahoma," Agr. Ext. Serv., Stillwater, Okla., Cir. 254, Rev. 1939, Frank B. Cross and L. F. Locke.

"Agricultural Research Serves to Relieve the Tax Burden," Agr. Exp. Sta., Corvallis, Ore., Sta. Bul. 359, Dec. 1938, Biennial Rpt. for 1936-1938, Ralph S. Besse.

"The Pennsylvania Agricultural Experiment Station, 52nd Annual Report," Agr. Exp. Sta., State College, Pa., Bul. 382, Sept. 1939.

"Fifty-first Annual Report," Agr. Exp. Sta., Kingston, R. I., Contb. 540, Feb. 1939.

"Extension Work in South Carolina, 1938—A Review of Agricultural Progress," Agr. Ext. Serv., Clemson, S. C., An. Rpt. for 1938.

"Steps in Growing Corn," Agr. Ext. Serv., College Station, Texas, C-137, Jan. 1939, E. A. Miller.

"Steps in Growing Peanuts," Agr. Ext. Serv., College Station, Texas, C-138, Jan. 1939, E. A. Miller.

"Steps in Growing Grain Sorghums," Agr. Ext. Serv., College Station, Texas, C-148, June 1939, E. A. Miller.

"Fifty-second Annual Report, 1938-1939," Agr. Exp. Sta., Burlington, Vt., Bul. 452, July 1939, J. L. Hills.

"Fruit Notes—Drought Spot or Internal Cork," Agr. Ext. Serv., Burlington, Vt., Oct. 2, 1939, Charles H. Blasberg.

"Department of Agriculture—Immigration of Virginia," Richmond, Va., Bul. 376, Nov. 1939, and Bul. 377, Dec. 1939.

"What's New in Farm Science," Agr. Exp. Sta., Madison, Wis., Bul. 446, Nov. 1939, An. Rpt. for Year Ending June 30, 1939.

"Serving Farm People on Many Fronts," U. S. D. A., Washington, D. C., 1937, An. Rpt. of the Ext. Service.

"Soybeans—Culture and Varieties," U. S. D. A., Washington, D. C., Farmers' Bul. 1520, Rev. Nov. 1939, W. J. Morse and J. L. Cartter.

"Variety Tests of Sugarcanes in Louisiana During the Crop Year 1936-37 and Summary of Annual Results, 1935-37," U. S. D. A., Washington, D. C., Cir. 531, Aug. 1939, George Arceneaux, R. T. Gibbens, Jr., and C. C. Krumbhaar.

"Report of the Secretary of Agriculture—1939," U. S. D. A., Washington, D. C., Henry A. Wallace, Secretary.

Economics

¶ "An Economic Study of Dairy Farming in Oktibbeha and Lowndes Counties, Mississippi, 1936-37" is the title of Bulletin No. 324 published by the Mississippi Agricultural Experiment Station. A study of this type in any of the Southern States has a rather wide range of interest because of the large amount of discussion with respect to diversification of agriculture and the prospects for the introduction of livestock enterprises on a larger scale. The study is based on an analysis of the business records of 56 farms for the year ending July 31, 1937. The records were secured by the survey methods from the cooperating farmers.

The major purposes of the study as set forth by the author are: (1) "To ascertain the farm management practices, expenses and profits of dairy farms of different sizes operating under varying conditions, and from these data to draw conclusions as to the most efficient size of dairy farms and the most efficient production practices; (2) To learn marketing practices, services, and cost of services used in marketing dairy products; the quality and quantity of products sold, and to point out any improvements which may be made in marketing facilities and services." The findings of the study may be somewhat limited since the two counties are located in the northeastern part of Mississippi where the predominating soil is described as black prairie land. The other soil types found are the post oak lands, the flatwood and the sandy loam. Other factors which are particularly favorable to the dairy industry include a long growing season and abundant rainfall.

That the dairy industry can be adapted to the South is demonstrated by the fact that of the farms studied, 17 returned net profits ranging from $919 to $2,486 and 19 other farmers had net profits ranging from $503 to $868. The 20 lowest varied from $1.00 to $483. In other words, none failed to produce some net profit. The estimated value of the operator's labor varied from zero in the case of 4 farm operators to $400 for 1 farmer and averaged $127 on all the farms. The operator's labor and management wage averaged $849 on all the farms. The average farm had $1,818 of farm receipts and $1,115 of farm expenses.

Perhaps the market facilities in this area are better than the average in the South due to the fact that dairying has been developing in this area for some time. Income from cotton and cottonseed rank next to dairying in producing cash receipts for the farm studied.

The author points out that one of the most important considerations for dairy farmers in this section is an increase in the average production per cow. He notes that there are some herds in the area that are fair in this respect but none are exceptional and the average of only 101.6 lbs. of butterfat sold per cow is very low. Perhaps the main reason for this was the failure "To weed, breed, and feed" to best advantage.

One of the greatest weaknesses in the area is the lack of the well-planned roughage program. Many operators fail to produce enough home-grown feed and it is estimated that 75 to 85% of the roughage is low in quality.

Another consideration that might

lead to increased efficiency and higher income would be a closer supervision in order to better utilize labor and management. It is suggested that probably the most desirable business unit would be one a little larger than the average, which might consist of 20 to 25 cows combined with cotton and such other enterprises as might contribute to the organization without seriously interfering with the dairy.

Emphasis may be placed on dairy production in this area since the Soil Conservation program emphasizes grass and grazing. Further, the unfavorable outlook for cotton has caused many counties in the South to look with greater enthusiasm to livestock as the possible solution. The author believes that with reasonable price conditions and proper number of good cows it should be profitable by skillful management to do dairy farming in this section.

"Walnut Production Cost Analysis, Orange County, Ten Year Summary 1929-1938," Agr. Ext. Serv., Berkeley, Calif., Harold E. Wahlberg.

"Types of Farming in Canada," Dom. of Can., Dept. of Agr., Ottawa, Ont., Pub. 653, Farmers' Bul. 77, Sept. 1939, I. S. McArthur and J. Coke.

"Eighth Annual Summary of Florida Citrus Costs and Returns," Agr. Ext. Serv., Gainesville, Fla., Misc. Pub. 28, Nov. 1939, R. H. Howard.

"1938-39 Season Annual Fruit and Vegetable Report, Florida State Marketing Bureau," State Dept. of Agr., Jacksonville, Fla., Oct. 12, 1939, Frank H. Scruggs.

"Agricultural Outlook for Illinois, 1940," Agr. Ext. Serv., Urbana, Ill., Cir. 500, Dec. 1, 1939.

"The Outlook for Indiana Agriculture in 1940," Agr. Ext. Serv., Lafayette, Ind., Nov. 1939.

"Analyses of Commercial Fertilizers," Agr. Exp. Sta., Lexington, Ky., Reg. Series, Bul. 18, June 1939, H. E. Curtis, H. R. Allen, and Lelah Gault.

"Prices and Index Numbers of Prices on Farm Products, Mississippi, 1910-1938," Agr. Exp. Sta., State College, Miss., Bul. 332, June 1939, Marvin Guin and D. W. Parvin.

"Type of Farming and Ranching Areas in New Mexico—Part 1," Agr. Exp. Sta., State College, N. M., Bul. 261, May 1939, Byron Hunter, P. W. Cockerill, and H. B. Pingrey.

"A Land Program for Forest County, Wisconsin, Based on An Analysis of Land Use Problems," U. S. D. A., Washington, D. C., Tech. Bul. 687, Sept. 1939, V. Webster Johnson, Sidney Henderson, and James H. Marshall.

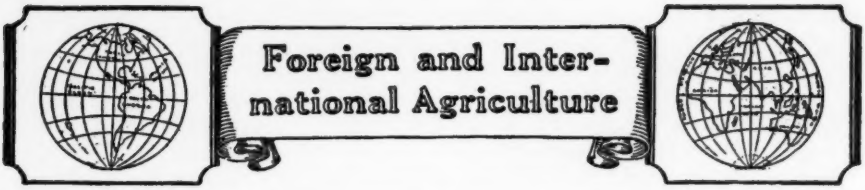
"Income Parity for Agriculture—Part I. Farm Income—Section 10. Income from Rye and Buckwheat, Calendar Years 1910-38," U. S. D. A., Washington, D. C., Preliminary, Oct. 1939.

Oregon Beets and Celery Need Boron

(*From page* 18)

given a high degree of control. On the Hayes farm in 1938 some of the untreated celery had 64% cracked stems, while 20 pounds of borax applied per acre reduced the crack to 2%. H. Watenpaugh, secretary of the Hayes Labish farm of Brooks, Oregon, estimated that the borax used in 1938 was responsible for about a 75% control of the celery crack on the farm as a whole.

A 30-pound application of borax per acre will not exceed $1.00 per acre. The material has higher sowability where used in granular rather than powdered form. It can be applied before seeding or plant transplanting or even in a side-dressing following the come-up of plants. To be distributed evenly over an area it should be mixed with a complete or incomplete fertilizer which is used as the foundation fertilizing material for the specific crop. There are strong indications that the borax can be used in the water applied to young plants, celery for example, previous to their being lifted to be set in the field, and that this treatment will suffice for the season.



To supply information on agricultural research and practice in other countries, brief abstracts of articles in foreign publications are given here. Due to space limitations, only articles of general fundamental interest are included, although the publications may contain other articles and reviews.

Die Ernährung der Pflanze, October 1939, Vol. 35, No. 10

INVESTIGATIONS ON THE INFLUENCE OF THE FERTILIZATION ON THE GROWTH AND DEVELOPMENT OF SOY BEANS. *By F. Alten and R. Gottwick, Berlin, Germany.*

Soy beans were grown several years on an experimental field, with different fertilizer treatments. One plot was unfertilized, another received 20 pounds of nitrogen and 50 pounds of phosphoric acid per acre, but no potash, while the other plots received uniformly 120 pounds of potash per acre from different sources, along with the nitrogen and phosphoric acid. The fertilization corresponded to 1,000 pounds of 2-5-12 per acre. The yields as a whole were low, due to unfavorable growing conditions, but interesting differences were observed. The crops were harvested for seed, but the plots lacking potash did not mature well, especially the first year of the experiment. The plants on these plots held their leaves, and could be harvested only 20 to 30 days after the completely fertilized plots. Potash always increased the yield of beans, in most cases markedly. The lowest yields usually were on the unfertilized plots, but sometimes on the nitrogen and phosphate plot.

The weight per bushel was usually increased by the potash fertilization, the effect being greatest when no manure or green manure had been turned under. Turning under manure, or green manure seemed to have a tendency to reduce test weight, although it usually increased yield. Potash fertilization reduced the protein content of the beans, but increased the fat and lecithin contents. It also decreased the nitrogen content of the beans, and usually of the straw. The phosphoric acid content was not influenced much by fertilization, nor was potash in the beans influenced much by treatment. The potash in the straw in all cases was increased markedly by potash fertilization. The authors believe there was some luxury consumption of potash by the plants.

The increased yields due to potash fertilization overshadowed any effects of treatment on composition, and resulted in much greater plant-food removal when full fertilization was given. The ratio of phosphoric acid to potash removed by the total crop varied between 1:2.13 and 1:2.37. The authors believe that the small amount of nitrogen applied is sufficient for the crop, since most of this nutrient can be obtained from the air by the nitrogen-fixing organisms in the root nodules. They state that the phosphoric acid and potash should be supplied in approximately the above ratio. The absolute amounts of nutrients removed by the crop in this experiment are not considered by them as a true guide to fertilization, since the yields were lower than a grower should obtain if he is to grow the crop with profit.

FERTILIZER EXPERIMENTS ON SUGAR CANE IN CUBA. *By C. E. Beauchamp, Habana, Cuba.*

In a series of experiments on the influence of fertilization on the yield

of cane and sugar, it was found that in most cases the nitrogen and phosphate increased the yield of cane over the unfertilized areas, while the addition of potash to the fertilizer increased the yield in all cases. In most trials the analysis was in an approximate 1:1:1 ratio.

The fertilization frequently but not always increased the sugar content of the juice. Other factors, particularly climatic, also influenced sugar content. If there was a rainy period as the plants approached maturity, growth was prolonged and sugar content reduced. High or low temperatures during the same period also worked similarly.

So far as the individual nutrients were concerned, nitrogen tended to reduce sugar content, while phosphate and potash tended to increase it. When all three nutrients were used in a proper ratio, high yields of cane with a high sugar content were obtained. The author also gave a summary of results of fertilizer work in other localities dealing with the influence of potash on the sugar content of the juice. These showed that if the potash in the soil or in the plant sap was low, potash fertilizer increased the yield of cane and sugar content of juice. In some work, nitrogen reduced the sugar content of the juice, but increased the yield of cane so much more that total yield of sugar per acre was increased. These references also brought out that weather and other seasonal factors influenced sugar content.

Annales Agronomiques, Vol. 9, Nos. 4 & 5, July-October 1939.

Observations on Methods for the Mechanical Analysis of Calcareous Soils. *By G. Aubert of Versailles, France, Lejaille and D. Bouzza of Relizane, Algeria.*

The authors discuss a modification of the international method for making mechanical analysis of calcareous soils. In the international method, the soil is treated with hydrochloric acid to decompose the carbonates, and permit thorough deflocculation of the soil particles. The authors believe that the acid attacks more than the carbonate, and decomposes some of the finer soil particles. They also believe that the use of sodium citrate, used by some workers, also is unsatisfactory at times, for the same reason. The method proposed is the treatment of the soil with potassium chloride solution to remove exchangeable calcium and then dispersion of the soil with ammonia solution.

Determination of Plowing Depth. *By S. Miklaszewski, Warsaw, Poland.*

A study of the favorable depths for plowing was made on various soils. It was found that no average depth could be given that would be most favorable for the soils of a region. The soil profile or depth and types of the various layers that make up the soil, must be taken into consideration. On yellow sandy soils, without a humic horizon, the plowing depth should be 8 to 12 inches, the maximum depth being attained slowly over a period of years so as not to dilute too much the organic matter content of the surface soil. On sandy podsol soil, the depth should be 8 to 10 inches, but may have to be less if the alluvial horizon is less than this depth. Light loessial soils, especially if podsolized, should not be plowed deeper than 8 inches; if higher in organic matter, the plowing may be deeper. On chernozems, and soils without a well developed profile, depth of plowing is not important, except that it is useless to plow deeper than necessary.

Some General Observations on Cultural Practices and Agrophysical Investigations. *By J. Apsits, Riga, Latvia.*

A general discussion of the physical properties of the soil, their influence on crop production, and their modification is given. It is believed that the study of soil physics has been neglected too much, especially the study of the

soil in the field rather than in the laboratory or greenhouse. The great alteration in many of the soil's properties when it is transported renders results obtained under other than natural conditions of doubtful value from the practical standpoint.

In field work, yields of crops are often determined, but along with yield data, observations on the physical conditions of the soil accompanying the yields should be made. The author states that the structure of the soil is continually subject to modifying conditions, natural and artificial, and therefore is always changing to some extent. One cultural practice may produce a superior structure of the soil over another practice immediately after completion, but later in the season the position may become reversed. It is therefore necessary to study the structure of the soil not only immediately after working it, but during the season.

In order to obtain more exact data on the influence of various practices on the physical properties of soils, the author lists five general lines of research undertaken by the experiment station of the University of Latvia. (1) Experiments to obtain exact data on the influence of various implements and cultural practices on the physical properties of the surface soil, especially on factors influencing growth, such as air, water, and heat. (2) The determination of the changes in the physical properties of the surface soil during the entire growing period, from the preparation of the seed bed to harvest. (3) The investigation of the relationships between the physical properties of the soil and plant growth to determine the degree to which the single factors, or combinations of them meet the exigencies of the principal crops. (4) The determination of the best methods for studying physical properties of soils *in situ*. (5) The study of possible ways of reducing the cost of cultural practices.

These investigations showed that the physical condition of the soil is not static but dynamic, varying irregularly both favorably and unfavorably.

Soilless Growth of Plants

(A Book Review)

GROWING plants in media other than the soil is not new. Botanists and plant physiologists have been growing plants in water, sand, and other media for many years. Many people have long been growing bulb plants in water or pebbles in their homes, without thinking much about it. Within recent years, however, the idea of growing plants without soil on a larger scale, or of growing types other than bulb plants, by supplying them with nutrients, has been publicized a great deal, and practiced to some extent. It can therefore rightly be said that there is a need for information on this new development, especially information compiled and presented in a form that is easily understood by the average person.

Carleton Ellis and Miller W. Swaney have written a book that should take care of this need in a satisfactory manner ("Soilless Growth of Plants," Reinhold Publishing Corporation, New York, 1938. $2.75). In a brief introduction, the authors point out the advantages and also some of the problems connected with growing plants in water, sand, or other media. Some of the points are further amplified in the body of the book. This should go far to reduce disappointment and failure by the inexperienced but over-enthusiastic "water farmer."

The first chapter in the book gives

general background information on how plants function and grow, and brief discussions on the importance of the various mineral nutrients. The next four chapters deal with specific information on growing plants in various media under different conditions. Full explanations and diagrams are given on the construction of tanks or other containers for the plants, methods of giving the nutrient solutions, methods of aeration, illumination, and other details. A chapter is devoted to plant growth substances or hormones and other special chemical substances that might be used to produce unusual effects on the plant. The discussion on diseases, parasites, and other factors that may adversely affect the growth of the plants will help the grower prevent or overcome many of the troubles that are likely to arise. The final chapter in the book deals with specific formulae that may be used to make up the nutrient solution.

The authors have sought to present the subject matter in as clear and nontechnical a manner as possible. Considering the complexity of some of the points they had to cover, they have succeeded very well. They have apparently drawn upon their own experience in growing plants in culture solutions, and as a result, the book has a very practical turn. Anyone interested in growing without soil will find the book helpful and instructive.

Better Plans Increase Income from Farm

(*From page* 14)

livestock, and the remainder in equipment, feeds, and supplies.

Other important factors coming from the study were that dairy sales per cow should be around $150, with a production of at least 5,000 pounds of milk per cow, and the amount of grain fed between 1,200 and 1,500 pounds per animal. As regards diversification, the amount of time spent on enterprises other than the dairy gave the highest income when not exceeding 45 per cent. When from 28 per cent to 45 per cent of time was spent on other enterprises, labor incomes jumped from $571 to $1,116, but when exceeding 50 per cent it dropped back to $763. Two other factors, namely, milk sold as fluid milk and a volume of business of $5,000 and over, resulted in higher labor incomes.

In any given area, the farmers who make the greatest financial success are the ones who organize and operate their farm business in such a way as to take advantage of the factors which are subject to their control. Although but few farmers can so organize and operate their individual business as to excel in all these points, most farmers can make considerable improvement in at least some of the important factors.

It must also be borne in mind that a general knowledge of soils and soil types is of great importance in farming. There are five major groupings of soils in the county, and these are covered by the Worthington, Hollis, Calais, Hermon, and Rough Stony land groups. Their requirements as to plant food vary as do the soils themselves. The Worthington, being productive, good grassland requires lime, phosphorus, and potash, while it is not economical to supply too large amounts of these minerals to the Hollis which is low in productivity. The Calais and Hermon groups, like the Worthington, also respond well to lime, phosphorus, and potash. It is best that rough stony land be returned to reforestation. Whether it is Caledonia County or Vermont as a whole, agriculture can greatly benefit from these farm surveys and analyses.

Agronomic Problems of the South

(*From page* 10)

quick tests in general. Earlier in this paper it was indicated that there was a great need for information relative to the fertilizer needs of soils under a vast number of conditions not represented by the usual field test. The soil chemists may render an extremely valuable service through the development of really reliable quick-test methods to determine fertilizer needs on various soils and for various crops not now represented by field tests. Reliability of such tests must be beyond reasonable doubt. Farmers now use from $12,000,000 to $20,000,000 worth of fertilizer in each of several southern States. Fertilizer practice that involves such huge sums of money must be on as firm basis as possible. Farmers should not be the victims of poor judgment and bad advice based on faulty methods.

While we are still talking about fertilizers and soil amendments in general, it might be profitable to discuss briefly several questions relative to the leaching of fertilizers. It appears to be generally assumed that certain nitrogenous fertilizers are quite readily leached from soils, and that most nitrogenous fertilizers may be leached fairly easily. Accumulating evidence indicates that on certain soils the danger of leaching is almost nil, even if nitrates are used. On the other hand, on sandy soils and in humid climates, nitrogen losses from leaching may be severe. There is some evidence that indicates considerable loss of mineral elements by this means also. But there is no great amount of available information relative to losses of nitrogen by leaching, under field conditions. In connection with the mineral elements, there are but few carefully conducted, convincing experiments to show the extent of leaching losses. In most cases, southern farmers apply more phosphoric acid than is removed in the crop.

Joint Responsibility

In the case of truck farming, many times more mineral elements are applied than are removed in the crop. Is there a single agronomy department in the South that can present a clear-cut picture of the final disposition of applied mineral fertilizer elements? How much of such material is lost by erosion? How much of it is lost by filtration into the subsoil? How much of these losses, if any, may be prevented by different and better cropping systems? When it is recalled that millions of dollars are

spent annually for fertilizers in the South, it immediately becomes apparent that these types of questions are pertinent.

If the question be asked, What is the object of land preparation?—both the soils men and the agricultural engineers would probably feel that it is their job to answer this question. The chances are good that neither has a good answer. Is the same type of preparation needed on sandy soils as that which may be necessary on the clay loams and clays? Who knows what soil structure is best for biological activities and the production of plants under a given set of conditions? Why do some soils erode much more rapidly than others, even though the slope and cover may be identical? Is this difference in erodibility due to structure alone, or is it due to a difference in organic content, or both? If due to a peculiar soil structure, could such a structure be changed by practical means? What are the objects of cultivation? What is accomplished by the cultivation of a crop beyond weed control? May we not devise methods of planting and cultivation that will reduce the labor charge against some southern crops which now have a high labor requirement? All of these are subjects worthy of the best effort of the agronomists, and if need be, the agricultural engineer, cooperating. Possibly it may be turned around and the burden of responsibility placed jointly on these two groups of people, since neither one alone has the training, the background, and experience to handle these types of projects satisfactorily.

The Pasture Problem

A large percentage of the farms in the cotton belt of the South are without improved pastures. Real pasture land occupies a very small percentage of the land in farms. In recent years, there has been a steady increase in the interest in livestock and in pasture production. Unfortunately, the agronomists have done but little in the interest of pasture development. To be sure, there are a few pasture experiments, but there is only limited information relative to the subject that is known to be applicable over a wide range of soil conditions. In the main, the pasture problem in the South hinges around the maintenance of nitrogen. The chief pasture problem, therefore, will deal with legumes suitable for pastures under southern conditions. Many southern soils are so poor that they will probably produce pasture plants with such a low mineral content that animals will suffer from mineral deficiencies when grazed on these lands. The agronomists should determine the limit of these areas and find the necessary correctives for such lands, if direct mineral feeding does not solve the problem.

Which Legumes to Use

The limited work that has been done on pastures has already developed some real research problems. May there be a combination of legumes that will last through both summer and winter? Such a combination would make an ideal hog pasture. What combination of legumes and grass will make the best pasture? Can there be found a summer-growing legume with a winter grass, or may this be reversed to have a winter legume and a summer grass? Regardless of the angle from which the problem is attacked, the main questions to be solved relate to the production of the legume.

Then, there is the question of certain smothering crops like hop clover. These may appear to be very desirable, but when the severe smothering effect of such a crop is observed, one might be led to question whether hop clover is desirable in a pasture. At the present time, white clover appears to be the best legume for pasture production. On what soils will it grow well? What treatments are necessary on soils where it does not naturally do well? On what soils will it need lime? What strain of white clover is best? Can good pastures be made on common southern uplands? If so, what plants will be used? Will it be better to try to produce temporary

Scene on pasture experiments at the Belle Mina, Alabama, Experiment Station. Such experiments are helping to solve the South's pasture problems.

pasture plants on uplands than to try to depend on permanent pastures? Is drought more severe in its effects on permanent pastures or temporary pastures on uplands?

At the present time, permanent pastures are much more prominent than temporary pastures. The effect of severe drought on permanent pastures is well known, and when livestock farmers have their pastures so badly burned by drought that they must resort to buying feed to tide them over the distress period, they well remember it. How far may temporary grazing crops be supplied to carry livestock through such drought periods when the permanent pastures are burned out? Experiments in management on the Black Belt Station in Alabama indicate that this is one of the most important fields of experimentation. All these kinds of pasture problems must be tackled by the agronomists, if a foundation is to be laid on which the animal husbandmen may build a reasonably profitable livestock-production program in the South.

In all probability, the greatest opportunity for service by the agronomists of the South lies in the field of plant breeding. Aside from a great deal of breeding work done on cotton, plant-breeding operations by the several experiment stations have been rather limited in scope until the last few years. Recently, a few of the southern stations have started rather extensive plant-breeding programs; however, the field has scarcely been touched. Some of the needs that might be met through the operations of the skilled and well-trained plant breeder are listed in the following paragraphs.

In the southeastern States, vetch, Austrian peas, and crimson clover are common winter cover crops. These are now planted to the extent of some 45 or 50 million pounds of seed annually in the three States of Georgia, Alabama, and Mississippi. Vetch and Austrian peas are both subject to a number of destructive diseases. If disease-resistant strains of either of these, or both of these, were available, the winter cover-crop program could be put forward more rapidly than it is moving at this time. Neither vetch nor Austrian peas is a good seed producer. Many millions of pounds of seed are bought annually. The necessity of buying seed and the

scarcity of cash with which to buy seed are factors that operate seriously against the expansion of the use of these two crops for soil cover and improvement. If there were available in the South a strain of vetch or Austrian peas that was highly resistant to disease and produced seed freely, the winter cover-crop program in the South could be made very much more effective and extensive than it is. Crimson clover is fairly well adapted to much of the southeastern States. It would be a much more valuable crop if it had a considerable percentage of hard seed, which would enable the grower to use it without the necessity of reseeding each year. A crimson clover strain that matured earlier than the common variety would be highly desirable.

Common lespedeza is found on a wide range of soils throughout the entire southern States. Among its weaknesses are its slow growth in early spring and its small root system. It might be a more serviceable crop if it had more hard seed. If some plant breeder will produce a much more vigorous strain of common lespedeza, and especially a strain with more vigorous root system, the possible value of such an improved strain would be difficult to forecast. Lespedeza sericea is a crop of considerable promise, but as long as farmers must grow a strain with a high tannin content, the crop will not be as valuable as it could be. The plant has a tendency to shatter its leaves very easily. It is also a little coarse. Why can't some energetic plant breeder develop a strain of Lespedeza sericea that has fine stems, that holds its leaves well, and that has a low tannin content?

Common Pasture Grasses

Among the grasses, Dallis and Bermuda are the most common in pastures in the South. At the Georgia Coastal Plains Station, breeding work is under way to secure an ergot-free strain of Dallis grass and an improved strain of Bermuda grass. Even a casual inspection of the work under way at the Station indicates the almost unlimited possibilities for improvement in these two varieties of pasture grasses.

The quality of bluegrass as a pasture plant is well-known throughout the livestock-producing areas above the Cotton Belt. The crop does not do well in the greater part of the area. Is it too much to hope that the plant breeder could secure a strain that could be grown much further south than bluegrass is now supposed to be adapted? If bluegrass could be added to the other pasture grasses, more rapid improvement in pasture in the Cotton Belt could be effected.

Need New White Clovers

In the light of existing information, white clover is the most promising legume for pasture development in the South. The crop will stand severe cold and is adapted to a considerable range of soil and climatic conditions. Plant breeders interested in pasture development should find in white clover a crop that challenges the best that is in them. By the latter part of May, due to heat or drought or to both of these, white clover usually disappears from pastures. This is particularly true on upland. In moist positions, white clover may persist through a good part of the summer. This leads to speculation as to the possibility of discovering strains sufficiently resistant to drought and hot weather to enable them to grow throughout most of the summer months. The crop does best on lands that are only slightly acid. May not acid-tolerant strains be found? An acid-tolerant strain of white clover might extend its use over countless thousands of acres of land that would need to be limed for the usual strains of white clover.

There are already several existing strains of this plant, but it is quite probable that the possibility of improvement through selection and hybridization has scarcely been touched. Since the maintenance of nitrogen is fundamental in the maintenance of southern pastures, and since white clover has a growing

season that fits in well with the present pasture program of a legume and a grass, the potential value of this crop in southern pastures can scarcely be over-estimated.

Peanuts now occupy a large acreage in the southeastern States, and the importance of the crop is increasing. But little work has been done on peanut improvement except at one or two experiment stations. The possibility of increasing the yield through plant selection and hybridization has scarcely been touched. Most kinds of peanuts are subject to a number of diseases. Few of these diseases can be economically controlled by application of chemicals. Might not the plant breeder provide disease-resistant strains of peanuts, just as we now have wilt-resistant cotton, rust-resistant wheat, etc.? Some varieties of peanuts produce a high percentage of "pops." Is it too much to expect that some plant breeder might take an otherwise desirable variety of peanut and increase the production by breeding for freedom from "pops?" Some of the best varieties of peanuts have too long a growing season to fit into a farm program near the upper limits of the Cotton Belt. The so-called Alabama or North Carolina runner is in this class. If some plant breeder could produce a high-yielding strain of this type of peanut that would mature 3 or 4 weeks earlier than the strains now being used, the area suitable for producing peanut-fed hogs could be greatly extended.

Peanuts for Oil?

In certain sections, soybeans are being grown chiefly for their oil content. Is it not possible to produce a high-yielding strain of peanuts with a high oil content that would enable southern farmers to grow peanuts for the oil content, just as some Corn Belt farmers are now growing soybeans for oil? A considerable part of the southern peanut crop is harvested. Where runner peanuts are harvested, farmers lose from 15 to 20 per cent by having them stripped off in the soil when the plants are plowed up. To be sure, these shattered peanuts may be salvaged by hogs. There are thousands of tenants who do not have hogs with which to salvage these peanuts. A non-shattering strain would increase the value of harvested peanuts under these conditions to the extent of possibly covering the cost of production.

Oats - Corn - Cotton

The so-called rust-resistant varieties of oats, like Texas Rust Proof, have but little rust resistance when planted near the Gulf Coast. Frequently, farmers in areas within 100 miles of the Gulf Coast lose their oats entirely because of rust damage. The production of a high-yielding strain of oats that would be resistant to rust under these conditions would be a very valuable addition to the crops available for use on thousands of farms. Oats are frequently subject to lodging under the weather conditions existing in the South. A strain with a straw sufficiently stiff to stand up under southern thunderstorms would be highly valuable.

There might be listed a number of problems in connection with breeding corn for the southern States. One of the most important is the production of a high-yielding variety with shuck covering that is long and tight enough to protect the ear from the ravages of weevils and ear worms. Superior-yielding strains or hybrids cannot make much of a showing on land that produces, say, 15 bushels per acre. Where high yields are possible, there is great need for better-yielding kinds of corn.

The most important cotton-breeding problems involve improvement of quality, yield, and disease resistance. It has taken the cotton breeder many years to combine high yield with good quality. However, much progress has been made along this line in recent years. Yet, there remains much to be done. This is particularly true in areas where cotton wilt is severe. There is room for much improvement in the quality of the

wilt-resistant strains and varieties now available. The plant breeders are still struggling with breeding methods in connection with wilt resistance. Apparently, there may be a number of strains of wilt. If there are not a number of strains of wilt, then it appears that a given strain may act differently in different soils and at different fertility levels.

The plant breeder has found more or less difficulty in uniformly inoculating soils with wilt organisms. How far do the different fertility levels influence susceptibility to wilt? How far do adequate amounts of the common plant nutrients, particularly potash, affect susceptibility to wilt? To what extent might strains of cotton be developed that are resistant to the seedling diseases that frequently injure the stands of cotton? There appear to be almost unlimited opportunities for the improvement of cotton along the general lines indicated by these suggestions and questions.

An Improved Farm Program

The agronomists may not realize it, but on their shoulders may rest the responsibility for building an improved farm program for the South. It is not enough for the specialists to turn out isolated pieces of research and leave the application of such results to someone else. When research findings are given to the public, the researcher who is most valuable is the one who can see clearly where his results will apply and goes about teaching the public where and how they may be applied. However, the agronomist should avoid becoming a "promotionist." It is unfortunate when we feel that it is up to us to "push our line." As specialist in agronomy, the best service is rendered when the worker is familiar enough with the farm problem to help work his findings into the farm program where he serves. If he does not, who will?

As a final topic, let me discuss briefly a subject that is not agronomic, but that is of interest to all agronomists in particular and to all agricultural workers in general. It is necessary to scan only a few advertisements to find cases where either an individual, a firm, or a corporation is advertising some kind of seed or some kind of fertilizer in a way that is misleading to the prospective purchaser. In these instances the fertilizer and seed advertisements completely ignore recommendations of experiment stations. Through extensive advertising the attempt is made to induce farmers to use fertilizers and materials that are unsatisfactory both as to the ratio of the elements and the amounts applied. Seed advertisers make extravagant and unsupportable claims as to the yield and the quality of the crop that can be made by planting the particular variety that they have to sell.

After large amounts of public funds have been spent in the interest of agronomic experiments to determine the best variety of a given crop or the best fertilizer practice for farmers in an area or in a State, the agronomists in particular and all agricultural workers in general should feel a responsibility to counteract the effect of false and misleading advertising by those who may have seed or fertilizer for sale which does not fit in with the program for a given area or State. Fortunately, the amount of such bad advertising is small. Nevertheless, it should be our responsibility to try to protect farmers against those people who apparently have little or no interest in the welfare of the consumer, but appear rather to take the attitude that let the buyer beware.

This incomplete list of agronomic problems indicates that the agronomists who serve best in the South in the future will put much less emphasis on cotton than they have in the past and will put increasing effort into the development of a feed, forage, and pasture program on which may be based an increased production of livestock with which to balance the South's cotton crop.

Watermelons Bring Cash to Mississippi

(*From page* 20)

Liberal fertilization of watermelons with a high analysis fertilizer is essential to high yields of quality melons. A survey conducted among Mississippi producers in 1939 showed that the majority used a 4-8-8 or 6-8-8 fertilizer and applied from 400 to 500 pounds per acre. Some of the growers used 600 to 800 pounds per acre. The fertilizer is applied at the time the land is bedded.

The melons are planted in hills 10 feet apart and in rows 10 feet wide, giving 440 hills per acre. For early production, growers make an early planting and then a second planting about 10 days later in the same hills, so that if the first planting should be killed or seriously injured by frost the second planting will be coming on and less time is lost.

Six to eight seed are planted to the hill and covered with about one-half inch of soil. After the seedlings have developed their first true leaves, they are thinned to one plant per hill. To prevent injury to the root system, the surplus plants are cut off above the ground with a hoe or knife.

Shallow cultivation is practiced to avoid injury to the shallow, extensive root system of the watermelon. The first cultivation is usually relatively deep to induce lateral root penetration and to facilitate penetration of water. Succeeding cultivations are shallow and farther away from the plant. When the vines meet in the center of the row, cultivation ceases. Moving the vines, except the tips, to permit cultivation does more harm than good. It destroys blossoms, drives away bees which pollinate the blossoms, and bruises the stems.

Grade While Growing

The most successful producers prune to obtain the largest possible number of No. 1 melons. They remove ill-shaped or otherwise inferior melons as soon as detected and try to leave the first two perfectly shaped melons that come on the vine. As these two approach maturity, two more well-shaped melons may be left on the vines to produce a second crop.

In Mississippi they grow them two to a vine, 1,000 to the acre.

Most Mississippi producers grow from 2 to 4 acres of melons as part of a well-balanced system of farming. With an acreage in keeping with the size of farming operations, the crop can be cultivated, harvested, and marketed with the regular farm supply of labor. There were quite a number of farms in 1939 that had 8 to 10 acres in watermelons, and one grower planted 1,000 acres.

Proper harvesting, careful handling, correct

grading, and proper loading are important. Experienced growers can readily tell when melons are ripe. The stems are clipped, not pulled, from the vine, and 1½ to 2 inches of stem are left on each melon. The melons are usually hauled in trucks rather than wagons to reduce danger of bruising. The insides of the truck bodies are padded and the floors bedded with straw or hay to prevent scarring or bruising in hauling. All melons are placed lengthwise, never on end, and stacked not more than three layers deep.

Watermelon time in Water Valley, Mississippi.

The melons are graded into two grades: grade No. 1 and unclassified. Grade No. 1 melons are over 18 pounds, shaped true to variety, free from disease, scars, bruises, with not over one-half inch hollow heart.

The No. 1 melons are usually graded further according to sizes, 18 to 22 pounds, 23 to 26 pounds, 27 to 30 pounds, 31 pounds and up. Cars are usually loaded with the same size melons as they can be stacked in layers more easily, carry better, and look more attractive. Most growers guarantee a three-point pack, which means that each melon touches the melons on each side, and melons in alternate layers are placed to break the points between layers. The top layer of melons is labeled.

The inside walls of cars are padded with straw and corrugated pasteboard and the floors strawed to prevent bruising. All melons are government inspected which facilitates sales and protects both buyers and producers.

Potato Fertilization in Michigan

(*From page* 22)

it is believed a decrease in yield as a result of fertilization is not a common occurrence.

Summing up the results of experiments covering a 14-year period shows that from 500 to 600 pounds of fertilizer of the grades recommended are as much as can be applied advantageously under average conditions of soil, climate, and price range for both potatoes and fertilizer. In a very favorable season, or with a higher price range for the crop, a heavier application of fertilizer may be made.

The typical potato soil in Michigan is not a soil with high moisture-storing capacity. This fact accounts in part for the modest quantity of fertilizer recommended and leads to the correct conclusion that on some of the more mois-

ture retentive soils, a somewhat larger quantity of fertilizer may be profitably applied.

When the tests were started in 1923, equipment for applying fertilizer in definite positions with relation to the seed piece was not available, and applications were broadcast and incorporated with the soil as the land was fitted for planting. Some attempt was made in 1924 to utilize the fertilizer attachment on the planters owned by cooperating farmers. Although these preliminary tests indicated the advantage of having the plant food near the seed piece, the equipment was so unsatisfactory that no more machine-placement trials were made until 1931, at which time a series of experiments involving six different placements were undertaken in cooperation with the National Fertilizer Association and the Division of Soil Fertility of the Bureau of Chemistry and Soils. After 2 years the Bureau of Agricultural Engineering replaced the National Fertilizer Association as a cooperator, and the tests were continued for 6 years. In order that additional studies on fertilizer placements could be made in other sections of the State, the soils department purchased the experimental planter used in 1931 and 1932 and has carried on trials independently since that date.

The results of all these studies have supported a generally accepted conclusion that fertilizer placed in bands about 2 inches away on both sides of the seed piece, and on a level with it or slightly deeper, gives somewhat better results than fertilizer placed in other locations. Fertilizers so applied frequently hastened sprout emergence, while plant food mixed with the soil around the seed piece caused delay in appearance of the sprouts above ground.

Potato growers planting such small acreages that the owning of a planter with fertilizer-placement attachment is unwarranted may advantageously apply the plant food with a fertilizer attachment on the cultivator at the time of first cultivation, according to results of field trials covering a period of 4 years.

So Did Lot's Wife

(*From page* 5)

continually flow from your hillsides and your mountain tops into their stagnant and putrescent depths. Tell them, those drivelers one and all, of whatever name, whether in church or state, who with their strategies and servilities and compromises and hypocrisies and apostacies affect to monopolize soul-saving and freedom-saving and world-saving exclusively to themselves, tell them that you, too, have something to do in this great work, and God granting, you of the farm are ready manfully to perform it.' "

Speaking up mildly from his post near the fire, our considerate host, himself a teacher at a local college, said as he marked a place in the copy he held: "Friends, I wish to read a little excerpt from a report by the editor after he visited the commencement of 1857 at Antioch college, as follows:

" 'With one hundred and fifty thousand dollars worth of buildings on a site which was a wheat field five years ago, located in the finest part of Ohio, and crowded with students from all parts of the Union, Antioch is at once promising and imposing. It was the magnetic power of President Mann that insured its career of prosperity. At the commencement twelve young gentle-

men and young ladies received the equal honors of the institution, reading essays and delivering orations equal to any of the graduates of Cambridge and Yale. The ladies in particular read their vigorous essays with a self-possession and modesty combined that dispelled all prejudice against college-bred women as the sun dispels the mist of morning. A more loyal and devoted band of brothers and sisters could not be found. They had read all their parts to each other, delivered them together in the woods and in their rooms, giving mutual aid for each other's improvement. Among those present were Governor Salmon P. Chase, Rev. Doctor Bellows, and Rev. Gannette of Boston.' "

OUR HOST added that one of the strong points of early agricultural journalism seemed to be a faith in higher education and a lofty idealism that may or may not be as typical of trade journals at present. To which our advertising agency friend slyly injected the remark that perhaps the colleges advertised more freely then than they do now and deserved editorial support thereby.

"May I intrude with feminine commentary?" queried one of the women guests, selecting a piece from the Home Circle of August, 1857. She read with charming naivete: " 'Of all modern improvements in dress we look upon hooped skirts as the least to be criticised and the last to be discarded by a majority of our women. They are healthful, comfortable and convenient; and always, when due regard is paid in their dimensions to height and contour of the figure, most decidedly becoming. Abused, we suppose they will continue to be; and ridiculed by men of coarse instincts and small brains. But a woman of good sense with an ordinary share of moral courage will find in this no objection—feeling it to be simply *none of their business.*' "

"Ah, but here is another piece worthy of a place next to yours," rejoined a young matron in the corner, leaning forward to scan the dim type under a better light. "It is called Spring Care of Children and here are two paragraphs for all of us to heed:

" 'Many ladies who are excellent helpmeets to their husbands in looking after the care of chickens, calves and lambs in the spring, fail to take proper care of their children. In the latter days of winter lighter clothing should be made ready to meet the demand, so that the darlings need not go uncomfortable a single day. I have many a time on these suddenly hot days seen the girls trudging along a mile from school, with red hot cheeks and burning heads under a quilted hood, with quilted skirts and woolen stockings to increase their lassitude; the boys sweltering under red flannels that prick and burn, with heavy jackets and caps, are fevered up to any degree of rudeness and mischief. We must not expect too much of the impulsive excitable nature of childhood. We should at least not make too heavy draughts on their amiability and patience. The children have trials enough, which we, with youthful feelings fading away, too often fail to appreciate.' "

HEARING chuckles in the opposite corner, we found a sage economist giggling at what he perceived to be early echoes of agricultural adjustment doctrine blended with soil conservation. "The editor says that the cry of the Fifties is for land, land, and more land. He advises farmers to work less land with better culture. This ceaseless demand for more acreage to till is termed by him Agromania. He says it leads to nothing short of deterioration of the soil, diminution of the crops, and demoralization of the farmer. He says in conclusion, 'No man has the right to sprawl himself all over the county just to exclude somebody else. This miser-

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"May I intrude with feminine commentary?" queried one of the women guests, selecting a piece from the Home Circle of August, 1857. She read with charming naivete: " 'Of all modern improvements in dress we look upon hooped skirts as the least to be criticised and the last to be discarded by a majority of our women. They are healthful, comfortable and convenient; and always, when due regard is paid in their dimensions to height and contour of the figure, most decidedly becoming. Abused, we suppose they will continue to be; and ridiculed by men of coarse instincts and small brains. But a woman of good sense with an ordinary share of moral courage will find in this no objection—feeling it to be simply *none of their business.*' "

"Ah, but here is another piece worthy of a place next to yours," rejoined a young matron in the corner, leaning forward to scan the dim type under a better light. "It is called Spring Care of Children and here are two paragraphs for all of us to heed:

" 'Many ladies who are excellent helpmeets to their husbands in looking after the care of chickens, calves and lambs in the spring, fail to take proper care of their children. In the latter days of winter lighter clothing should be made ready to meet the demand, so that the darlings need not go uncomfortable a single day. I have many a time on these suddenly hot days seen the girls trudging along a mile from school, with red hot cheeks and burning heads under a quilted hood, with quilted skirts and woolen stockings to increase their lassitude; the boys sweltering under red flannels that prick and burn, with heavy jackets and caps, are fevered up to any degree of rudeness and mischief. We must not expect too much of the impulsive excitable nature of childhood. We should at least not make too heavy draughts on their amiability and patience. The children have trials enough, which we, with youthful feelings fading away, too often fail to appreciate.' "

HEARING chuckles in the opposite corner, we found a sage economist giggling at what he perceived to be early echoes of agricultural adjustment doctrine blended with soil conservation. "The editor says that the cry of the Fifties is for land, land, and more land. He advises farmers to work less land with better culture. This ceaseless demand for more acreage to till is termed by him Agromania. He says it leads to nothing short of deterioration of the soil, diminution of the crops, and demoralization of the farmer. He says in conclusion, 'No man has the right to sprawl himself all over the county just to exclude somebody else. This miser-

able plowing, worse seeding, shilly-shally cultivation, and trusting entirely to Providence not only never pays but is moreover a wicked profanation of the benevolence of God, whose promise that the harvests "shall not fail" was made alone for the assurance and comfort of such as are obedient to his natural laws.' "

AND just beneath his editorial are quotations from the Patent Office reports which contain at least one astonishing statement for people to use when the continent was just opening to settlement.

"When first visited by Europeans a large part of the soil of our territory was charged with abundant humus and earthy phosphates, the accumulation of ages from primitive forest decay or animal remains. It is an open question whether there was not more absolute wealth invested in our soil in fertilizing matter at the time Columbus discovered America than there is at present above the surface in improvements and investments made by man."

"Well," said an extension soil expert, in answer to this thought, "I honestly think there was more truth in that funny idea than we want to admit—and in some counties of my State, we surely have lost more wealth from the soil than men have created above ground. I did not appreciate that pioneers ever worried much about their land fertility, but maybe the best farms today are handed down by fellows who subscribed to that old paper."

A lawyer who was interested in world affairs gleaned a titbit from the Foreign News of the late fifties. "It has a queer parallel with the situation we heard so much about this year. The news item says 'The Polish insurrection keeps gaining ground and the European powers are all taking a hand in the matter. Uncle Sam has been invited to dip his spoon in the porridge, but the Secretary of State answered that under no circumstances could we depart from the doctrine of non-intervention.' "

From that peek into the memories of other decades so long vanished, our company learned that men and women remain much the same through the haze of the years and the mists of time. Some of them learned for the first time that rural folk and their leaders enjoyed good literature and appreciated excellent music, set good tables, prized rare delicacies, and admired fine pictures and fruitful gardens. They learned that the farm leaders traveled considerably, even to New York and Washington betimes, and a few went abroad and sent home long letters with accounts of foreign scenes and noble buildings. They saw clearly that the writers of the humblest letters used precise diction and excellent spelling, or at least the editor made them seem that way. Many of them praised collegiate culture beyond the dreams of a wilderness life, bravely resolving at any rate to lay such a sturdy foundation for education that the generations to come would profit by their foresight.

HANDS that originally clasped those tattered files and read the closely typed pages by dim and flickering lights are the hands that rocked the cradle and broke the sod so that a life of freedom and enterprising zeal would become our birthright. Their principal obstacles were mechanical and physical ones, while ours are spiritual and mental. My wish is that when the next generation scans the files perused by this one, they will see some evidence therein that man has steadily pulled ahead in his courageous belief in America and its institutions. If we reflect bitterness and defeat or shed the salty tears of misery, we shall deserve no better fate than Lot's wife. It is no good to look backward unless we propose to go forward, armed with some faith and some hope, open-minded, persistent, and loyal—sure of our goal because we had such splendid traditions to guide us in the family records and the public files.

WHO YA SHOVIN'?

A small boy was hurrying to school, and as he hurried, he prayed, "Dear God, don't let me be late—please, God, don't let me be late." Then he happened to stumble and said, "You don't have to shove."

Aunt Jemima was brought into court one day for unmercifully beating her "orneriest" child. The judge after giving her a severe lecture, asked if she had anything to say.

"Jes one thing, Jedge. I wants to ax you if you was ever the parent of a puffectly wuthless culled chil'?"

"Now let's talk about you, shall we?" said the pretty film starlet.

"All right, dear!" replied her admirer.

"Well, then, what does a young man like you see in a girl like me?"

The guest's nose was exceptionally large, and father had noticed Willie staring at it. Expecting the boy to make some frank and outspoken comment, he gave him a disapproving glance.

"That's all right, dad," came the reassuring response. "I'm not going to say anything. I'm just looking at it!"

The peddler knocked at the door and started his sales talk with the statement that "I'm out scratching for a living."

"Sorry, but I don't itch," vowed the woman of the house as she slammed the door.

A girl doesn't have to watch the speedometer to know what her boy friend is driving at.

Mama Mosquito: "If you children are good, I'll take you to a Nudist Camp tonight."

"Twin beds are all very well," said the blushing bride to the salesman in the furniture department, "but there is no use buying them until we get the twins."

Teacher: "Johnny, can you define nonsense?"

Johnny: "Yes, teacher—an elephant hanging over a cliff with his tail tied to a daisy."

The doctor was questioning the new nurse about her latest patient. "Have you kept a chart of his progress?"

The nurse blushingly replied, "No, but I can show you my diary."

Notice in a Mississippi Newspaper—Absolutely no more baptizing in my meadow. On the past two Sundays good Christian people have left my gate open and before I chase my cows all over the county again, all sinners can go to hell.

A BAD CASE, TOO

"There's only one thing wrong with me, Blondie. I'm color-blind."

"You-all sho' mus' be, Mistah."

"Pick 'em fat, boys," advises a man who claims to know. "It's a lot easier to live with 200 pounds of curves than with 100 pounds of nerves."

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